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PLANTS & GARDENS
BROOKLYN BOTANIC GARDEN RECORD

Usual and Unusual Houseplants, their Basic Care & Culture, Sources, Societies

OL. 43, NO. 1
112

PLANTS & GARDENS

BROOKLYN BOTANIC GARDEN RECORD

Indoor Gardening

1987

Brooklyn Botanic Garden

Staff for this issue:

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BARBARA B. PESCH, *Editor*

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PLANTS & GARDENS
BROOKLYN BOTANIC GARDEN RECORD

Indoor Gardening

Vol. 43 1987 No. 1

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Cover photograph by Elvin McDonald
Basket containing: Gerbera daisy; Kalanchoe; *maidenhair,* Asparagus densiflorus *and button ferns; variegated* Hedera helix.

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foreword

People have become accustomed to living with plants—not only at home but in the workplace. Plants provide texture, contrast, color, and according to recent studies, some even improve the quality of the air we breathe.

The spectrum of candidates for indoor growing has widened. In *Plants & Gardens News,* Vol. 2, No. 1 a research report is quoted which indicates that many temperate-zone trees and shrubs grow well indoors. This study opens the door to mind-boggling possibilities. A yew (*Taxus* x *media* 'Hicksii') may grow not only in the garden, but in the living room.

Plant trends change with the times. Here at BBG the Auxiliary holds a semiannual plant sale. It has been noted that sales are on the rise for indoor plants that flower.

Charles Marden Fitch, Guest Editor of *Indoor Gardening,* has photographed and collected plants all over the world. Within these pages are photos of some familiar plants in their native habitats and some not so familiar. He has also collected a superior group of contributors to write on their special areas of expertise.

We hope you will be inspired to try growing plants that you have not known before, that those plants will prosper and your enjoyment be beyond measure.

Barbara B. Pesch
Editor

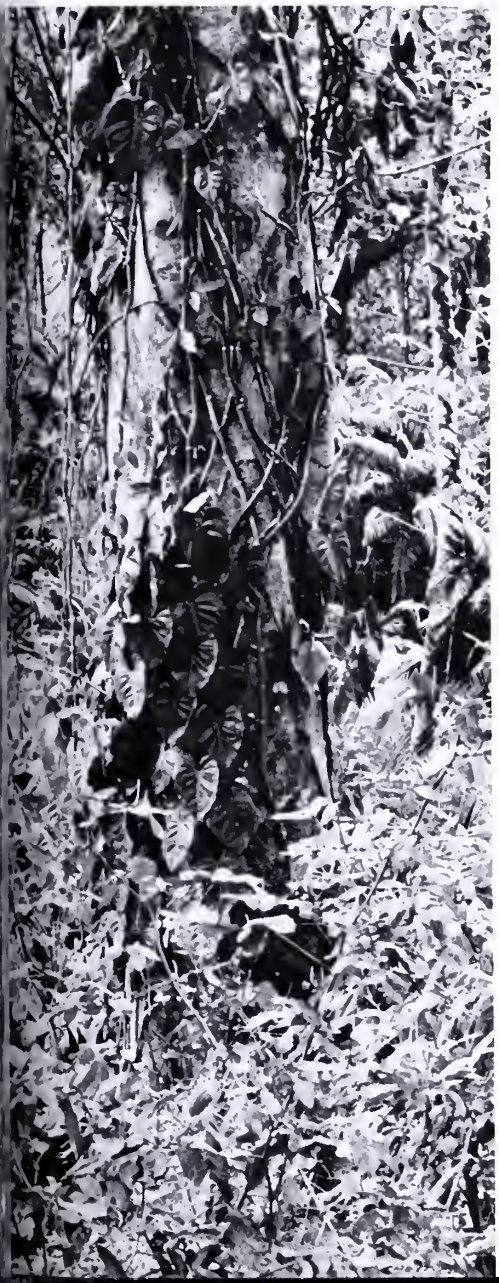
This photograph shows three small foliage plants for terrariums in their true size. At left Polystichum tsus-simense, *center is* Hedera helix 'Itsy Bitsy', *at right trailing* Helxine soleirolii *(Baby's Tears).*

Right: Calathea *sp. on humus of the forest floor in the Peruvian Amazon.*

Below: *The jungle has several different layers of plant growth as you can see in this unique view of a tangled Salvadoran tropical forest. Plants from the lower layers will grow well with less light than the high perched orchids or certain sun-loving bromeliads. Plant hunters are still finding new treasures for your houseplant growing pleasure.*

The World of Indoor Plants

A photo essay by Charles Marden Fitch



The plants we enjoy indoors are those that adapt to our conditions. Favorite indoor plants thrive with moderate temperatures, medium levels of humidity, and light intensities gardeners can provide without too much effort or added expense.

Throughout the world plant species and selected cultivars are treasured as living art. These welcome companions fill a need in gardeners' lives by offering beauty beyond borders—needing no translation to appreciate. These photographs show plants in their native habitats around the world.

Charles Marden Fitch, horticulturist, photographer, and international media specialist, frequently travels to study plants in tropical habitats. His recent publications include All About Orchids, *and a laser disc containing over 2,000 color photographs of exotic plants around the world.*

Peperomia japonica *thrives on coral rock along the coast in Tahiti. In terrariums peperomias can grow well in lava rock chunks or elsewhere with good drainage.*

Top Left: Platycerium coronarium *and* Polypodium *sp. on a rubber tree growing in central Malaysia.*

Bottom Left: *Tropical jungle plants in Thailand: seen here are ferns and* Pellionia daveauana, *a popular ornamental plant grown indoors around the world. Pellionias are creeping plants well suited to warm humid conditions and low light. The species seen here at left, center and right, is appreciated for its bronze foliage with metallic center stripe.*

Above: *Charles Marden Fitch, guest editor, examines bromeliad* Tillandsia multicaulis *growing on a Central American mountain slope. Passing clouds provide high humidity.*

Above: Sansevieria ehrenbergi *growing in the dry habitat of Tanzania with Rock Hyrax.*

Below: *Growing epiphytically, these ferns and peperomias grow with roots in humus accumulations and moss on a tree trunk in Costa Rica. High humidity and mists at the 2,200 meter altitude keep plants plump, even during the dry season.*

Aroids

James B. Watson

Of the over 2,000 species of aroids, only a fraction are grown as houseplants. Many come from the tropics where they grow as understory plants (thus adapted to low light levels) making them durable houseplants. There are other genera and species for those who seek unusual plants to grow in their apartment, home, or greenhouse. Aroids can also be moved outdoors onto the patio or balcony during the summer.

Members of the aroid family are often difficult to identify because of the diversity in leaf shapes and patterns, but they all possess the same floral structure. Aroid flowers are tiny and packed onto a fleshy spike, called a *spadix*. The spadix is accompanied by a modified leaf called a *spathe*. Spathes are usually green or white, but some are other colors. The bright orange flowering anthuriums popular in flower arrangements are well-known aroids.

Philodendrons, dieffenbachias, caladiums, and some other aroids contain crystals of calcium oxalate in their stems and tubers. When chewed, these crystals puncture mucous membranes, causing swelling and skin irritation. Parents may want to keep young children away from aroids with such irritating crystals. The pain caused by calcium oxalate crystals can be soothed by placing a teaspoon of sugar in the mouth, or with cool liquids or lime juice. Gardeners taking cuttings or dividing tubers can wear plastic gloves to protect their skin.

Opposite: Monstera friedrichsthalii *climbs a tree trunk near Palenque, Mexico.*

James B. Watson is a member of the International Aroid Society, and has served on its Board of Directors. He works at Fairchild Tropical Garden in Miami, Florida.

Culture

Aroids are not demanding culturally, making them good choices for busy people who love plants, but don't want to spend time caring for them. A sampler for beginners includes: *Aglaonema, Dieffenbachia, Philodendron,* Pothos (*Epipremnum*), *Spathiphyllum,* and *Monstera deliciosa.*

Light. Aroids can be placed next to windows or several feet away. Some will grow in dark places, but they should be moved near a window periodically to encourage new growth. *Aglaonema, Dieffenbachia,* Pothos, and *Spathiphyllum* grow satisfactorily in the light commonly found in offices and stores. Aroids in greenhouses need shading during the summer. Acclimate them to brighter light before placing them outdoors during the summer. Keep the leaves looking their best by removing dust with a damp cloth.

Several aroids are small enough to grow under fluorescent lights. Place them 12 to 18 inches from the tubes. Some aroids to grow under lights are: *Anthurium scherzerianum* (pigtail flower), *Anthurium amnicola* (also called *A. lilacina*), and compact hybrids, such as *A.* 'Lady Jane,' *Aglaonema costatum, A. rotundum, Alocasia bullata, A.* 'Fantasy,' *Caladium humboldtii, Philodendron grazilae, Spathiphyllum wallisii* and *S. floribundum variegatum.*

Water. Keep soil moist, not wet or bone dry.

Humidity. Philodendrons, monsteras, and aglaonemas tolerate 20 to 30% humidity, but they prefer 50% or higher. A general rule is that aroids with thick leaves tolerate lower humidity than those with thin leaves.

Fertilizer. Fertilize once a month with 20-20-20 or a similar plant food. Feed plants in dark areas less frequently during the winter.

Temperature. They require warm temperatures to flourish. Day temperatures of 70 to 80 °F with a 5 ° drop at night are ideal. Some aroids show leaf damage at temperatures below 55 °, although a few tolerate temperatures down to 45 ° for a short period.

Soil. Use a well-drained mix, such as equal parts peat moss, perlite, and pine bark mini-nuggets, or add perlite or shredded tree fern to a basic mix for houseplants.

Containers. Select a container made of clay, plastic, or wood. Styrofoam containers are adequate for small aroids, but they are not heavy enough to hold large plants upright. Grow trailing aroids in tree fern, plastic, clay, or wooden slat baskets, or wire baskets lined with moistened sphagnum moss. Vining aroids can be trained on cedar stakes or other supports.

Pests. Aroids are relatively pest-free but aphids and mealybugs can infest new growth or the petioles (leaf stalks) where they join the main stem. Control pests by spraying them with soapy water (Basic H or a gentle, organic based soap).

Water plants early in the day and make sure there is good air circulation around the plants to prevent fungus problems. Remove damaged leaves and inflorescences to keep aroids healthy and looking their best.

Propagation

Aroids may be propagated by air layering, cuttings, division, tubers, and seed. Commercial growers also propagate aroids through tissue culture, but this method is not appropriate for the home grower.

Seeds. Aroids rarely set seed in the home and greenhouse. Since the seeds are short-lived many mail order firms do not sell them. However, new hybrids are grown from seed, and sometimes seeds of new species are received from the jungle.

Separate the seeds from the pulp of the berry. Germinate the seeds on sphagnum moss, a mixture of equal parts peat moss and perlite, or a prepared mix, such as Jiffy-mix. Provide warmth, a shady but lighted area, and moisture. Fertilize seedlings with quarter strength plant food every two weeks. When they develop several leaves, pot them in community pots or individual containers in a porous mix.

Air-layer. Air-layering a stem reduces transplant shock when it is removed. Air-layer the leggy stems of slow-growing aroids, such as the velvet-leaved anthuriums, some philodendrons, dieffenbachias, and *Homalomena rubescens.* Place a handful of moistened sphagnum moss around the stem. Cover it with plastic tied at the top and bottom, or with aluminum foil crumpled around the stem. Cut the stem after roots grow into the moss.

Cuttings. Philodendrons, pothos, Chinese evergreens, and syngoniums are among the many aroids that can be propagated by tip cuttings. Shoots at the base of aglaonemas, anthuriums, and philodendrons can also be cut and rooted. Place cuttings in a damp mix of equal parts peat moss and perlite.

Division. When aroids fill a pot, unpot the plant and cut it into several pieces. Divide plants in the spring or summer.

Tubers. Alocasias and caladiums grow from rhizomes and tubers. New ones are produced, often in the summer. These can be dug and repotted when the parent plant is dormant or in active growth.

Directory of Aroids

This list includes aroids commonly grown as houseplants and some rarer collectors' items. The botanical name, common name, and methods of vegetative propagation are given for each genus.

Code for method of propagation: A = air-layer, C = cutting, D = division, T = tuber R = rhizome..

Aglaonema. (Chinese evergreen. C, D.) These herbs are native to areas where it rains for half of the year and then is dry. Aglaonemas are perfect for gardeners who water irregularly. They also tolerate low humidity and light levels.

A. modestum has erect stems and pointed, glossy green leaves. The leaves of *A.* 'Silver Queen,' *A.* 'Silver King,' and other cultivars are green variegated with silver or other shades of green. The leaves may be rigid or lax, with flat or wavy margins.

The following aglaonemas require high humidity and more care. *A. pictum* has dull, velvety leaves which are bluish-green with patches of silver-grey. It grows one to two feet tall. *A. pictum* var. *tricolor* has pink leaf stalks

This Anthurium gracile *plant was grown from seed collected by the Guest Editor, Charles Marden Fitch in the Peruvian Amazon area. The berries are deep orange.*

and two shades of grey in its leaves.

A. rotundum and *A. costatum* grow eight inches tall. Grow them under lights, in dish gardens and terrariums. The thick, succulent leaves of *A. rotundum* are coppery green with pink veins above and wine-red below. *A. costatum* has thinner, larger leaves—green speckled white. Several cultivars show variability in the amount of variegation.

Alocasia. (Elephant's ear. D, R.) Alocasias require warmth, moisture, and high humidity. In dry atmospheres they may be attacked by spider mites. Look for tiny red spiders and white webs on the lower leaf surface.

A. 'Portora,' *A.* 'Calodora,' and *A.* 'Novodora,' are large evergreens with scalloped-edged leaves. Use them in garden rooms or greenhouses. A smaller species is *A. cucullata* which has pointed leaves eight inches long. *A. bullata* is eight inches tall with heavily textured leaves. It is also sold as 'Hawaii,' and 'Quilted Dreams.'

Many alcoasias have shiny leaves in shades of green, grey and purple. There may be contrasting white or silver veins, and purple or red undersides. Several of these are *A.* x *amazonica, A. lowii, A. sanderiana,* and *A. watsoniana.* The 12-inch scalloped leaves of *A. cuprea* are metallic copper. The cultivar 'Blackie' has larger leaves with more black color. These fancy-leaved alocasias go dormant in the winter if temperatures drop below 60°.

The one-foot-long leaves of *A. micholitziana* are velvety green with contrasting white veins. *A.* 'Green Velvet' has leaves twice as large and with showier veins.

Anthurium. (A, C, D.) Flowering anthuriums are now available in colors other than orange and red—pink, mauve, green, and brown. Some have speckled spathes and others have double or triple spathes. Indoors, anthuriums require bright, diffuse light and high humidity to flower. Outdoors, in the tropics of Hawaii and Jamaica, growers provide up to 70% shade from hot tropical sun, to improve spathe color.

Compact flowering anthuriums may be grown under lights. Try *A. amnicola* (also sold as *A. lilacina*, lilac spathes, eucalyptus odor), and *A.* 'Lady Jane' (rose-pink spathes). *A. scherzerianum* has a red spathe and yellow spadix. Its common name pigtail flower refers to the coiled spadix.

Many anthuriums are grown as foliage plants. Several have velvety leaves with glistening white veins. *A. clarinervium* is compact. Three collector's items with larger and fewer leaves are *A. forgetii, A. magnificum,* and *A. warocqueanum.* Many hybrids are also available. Air-layer plants with leggy stems.

Strap-leaved anthuriums have leaves that resemble belts. Grow them in hanging baskets. Strap-leaved anthuriums, and those with velvet leaves, will not grow well at temperatures below 60°.

Several strap-leaved species are available. *A. gracile* has 12-inch-long leaves. *A. bakeri* has longer leaves and sets clusters of red berries. *A. wendlingeri* has leaves 30 to 40 inches

Philodendron *'Spider' with its much-cut leaves appears delicate and feathery.*

long. Its spadix is coiled. *A. vittariifolium* is similar.

Many anthuriums have heart-shaped leaves. *A. brownii* and *A. watermaliense* can be grown as houseplants. *A. radicans* is a ground cover or basket plant with stiff, bubbly leaves.

Anthurium veitchii is the most striking foliage anthurium. Its pendant three-foot-leaves are rippled, causing light to be reflected from the glossy, dark green surface.

Some anthuriums have lobed leaves. *A. polyschistum* is a delicate vine. *A. podophyllum* is a shrub.

Bird's-nest anthuriums have rosettes of leaves. They grow in low or bright light and will tolerate low humidity. Many have green leaves and are sold unidentified. *A. guayanum* (also sold as *A. jenmanii*) has dark maroon new leaves. The leaves of *A. superbum* are dark green above and purple below.

Caladium. (Angel-wings, mother-in-law plant, elephant's ear plant. D, T, R.) Caladiums are grown for their showy leaves.

C. humboldtii has two-inch green leaves spotted white. This miniature can be grown under light or in a terrarium.

Large, fancy-leaved caladiums are sold by name through nurseries and catalogs. Many have been developed since hybridizing began in France in the late 1900s. The leaves may be green with red, purple, pink, or white veins or speckling. Some have white leaves with green veins or a pink blush.

Grow them as container plants, in window boxes, or on the patio. The tubers begin to grow in February or March. Plant one or several to a pot and provide moisture, warm temperatures, and bright light for healthy growth. When the foliage dies down in the autumn, withhold water and let the tubers remain dormant for the winter.

C. lindenii, sometimes sold as *Xanthosoma lindenii,* is an evergreen with striped leaves that resemble a zebra. Propagate it by dividing the rhizomes.

Dieffenbachia. (Dumb cane, dumb plant, mother-in-law's tongue plant. A, C.) Dieffenbachias are popular in offices, stores, and dark corners of the home. They can also be grown in bright light near windows. As the stems grow it is natural for the lower leaves to yellow and die. Cut these leaves off.

When there is a tall stem with only a few leaves at the top, it can be cut back. Cut the tip into a stem cutting with several leaves. Root it in a mix of equal parts peat moss and perlite, or in a glass with a few inches of water. Cut the long stem into segments two or three inches long and lay each piece horizontally in the mix. Each will sprout and grow into a new plant. The stem left in the pot will also grow into a new plant.

Many cultivars with variegated leaves are sold in grocery stores and nurseries. The com-

mon ones are 'Rudolph Roehrs,' 'Exotica,' and 'Tropic Snow.'

Epipremnum. (Pothos, hunter's robe, taro vine, devil's ivy. C.) Small pots and hanging baskets of pothos have juvenile leaves which are two or three inches long. Plants grown on trees in the tropics bear adult leaves which are two feet long with slits. The leaves of *E. aureum* are green with yellow markings. *E.* 'Marble Queen,' a cultivar with pure white markings, is less vigorous.

Homalomena. (A,C.) These succulent herbs require warmth and high humidity to grow successfully. *H. rubescens* can be kept low or grown to four feet. Its smooth, round, dark green leaves are borne on red petioles. The red spathes, which look like short cigars, are clustered along the stem. Many homalomenas are sold unidentified.

Monstera. (Window-leaf. C.) Monsteras are evergreen vines which can be grown on stakes or against a wall. Stems in hanging baskets rarely trail.

M. deliciosa is a common houseplant with two common names, ceriman and swiss-cheese plant. Several forms are cultivated. The leaves may be 12 to 30 inches long. One cultivar has variegated leaves. *M. deliciosa* tolerates low light and humidity, and will grow under many cultural conditions.

Philodendron (A, C.)Philodendrons fill many interior niches. Many are large shrubs and vines which have different growth habits. Most philodendrons tolerate low humidity and light, but do better with bright light and 40 to 50% humidity.

Self-heading philodendrons have a rosette of leaves on a short stem. *P. selloum* has deeply lobed leaves. *P. speciosum* has triangular leaves. A compact hybrid two feet in diameter is *P.* 'Pluto.'

Most philodendrons are vines, suitable for hanging baskets. Some have reddish leaves. Vining philodendrons with long stems can be grown on stakes or other supports. *P. scandens*, a common houseplant, has heart-shaped leaves five inches long. The leaves of *P. squamiferum* have irregular wedges cut out of them. Its stiff stem is bristly. The leaves of *P.* 'Spider' are cut into many long, narrow, stiff segments. *P. grazielae* is a slow growing miniature with round leaves.

Several philodendrons have variegated leaves. The velvety leaves of *P. gloriosum* are green with white veins. *P. mamei* has quilted green leaves overlaid with silvery-grey variegation.

Rhektophyllum. (C,D.) *Rhektophyllum mirabile* is an evergreen with heart-shaped leaves. They are green with patches of white between the veins. Propagate by division or cutting off the stolons and rooting them like cuttings.

Schismatoglottis. (Drop-tongue. D.) These compact herbs have variegated leaves. Some are speckled or banded green or cream, while others have a burnished look. They require moist soil, high humidity, and temperatures above 60 °F. Small species can be grown under lights. Many are sold unidentified.

Philodendron *'Red Princess' requires support. The bold leaves open red and change to green.*

Spathicarpa. (D.) *S. sagittifolia* is grown for its curious inflorescence. The spathes resemble small blades of grass. It grows to eight inches in height. Plant it in small pots or terrariums, or grow it under lights.

Spathiphyllum. (Spathe flower, madonna lily. D.) Spathiphyllums have strap-shaped green leaves. The spathes are usually white, rarely green or pink. These evergreens require plenty of water. Drooping leaves signal they need water. Divide plants every few years to keep them healthy.

Common varieties are *S. clevelandii* and *S.* 'Mauna Loa.' *S.* 'Mauna Loa St. Mary' is five feet tall with white spathes the size of dinner plates. *S.* 'Mauna Loa Supreme' is similar, but more compact.

Several compact spathiphyllums can be grown on tables or the windowsill. *S. wallisii* grows 14 inches tall with glossy, wavy-edged leaves. 'Svend Nielsen' has wider, glossier leaves.

Spathiphyllum floribundum variegatum has quilted leaves variegated dark and light green. It grows eight inches tall. Its tiny, narrow spathes are white. Grow it in a dish garden, terrarium, or under lights.

Syngonium. (C.) *Syngonium* vines grow well on stakes or totems. As a stem grows, the leaf shape changes from a small arrowhead-shaped leaf to one with several lobes. The leaves may be green or variegated white, yellow, or silver. *S. podophyllum* is commonly called nephthytis, African evergreen, and arrowhead vine. Its leaves are green. The cultivar 'Albovirens' has white and green leaves.

Learning More

Additional information on aroids is available through the International Aroid Society, P.O. Box 43-1853, South Miami, Florida 33143 U.S.A. *Aroideana,* an illustrated journal, is published quarterly by the Society.

Monstera deliciosa *has deeply cut, mature leaves while the new ones are solid. Sturdy roots shoot out along the stem seeking support for the upward growing leaves.*

Common Names of Aroids

African Evergreen: *Syngonium podophyllum*
Angel-wings: *Caladium*
Arrowhead vine: *Syngonium podophyllum*
Ceriman: *Monstera deliciosa*
Chinese evergreen: *Agloanema*
Devil's ivy: *Epipremnum*
Drop-tongue: *Schismatoglottis*
Dumb cane: *Dieffenbachia*
Dumb plant: *Dieffenbachia*
Elephant's ear: *Alocasia, Caladium*
Hunter's robe: *Epipremnum*
Madonna Lily: *Spathiphyllum*
Mother-in-law plant: *Caladium*
Mother-in-law's tongue plant: *Dieffenbachia*
Nephthytis: *Syngonium podophyllum*
Pigtail flower: *Anthurium scherzerianum*
Pothos: *Epipremnum*
Spathe flower: *Spathiphyllum*
Swiss-cheese plant: *Monstera deliciosa*
Taro vine: *Epipremnum*
Window-leaf: *Monstera*

Top-Notch Begonias

Photos by E. & M. Thompson

Tuberous begonia B. *'Maxwelton' performs well in a hanging basket. Moss-lined wire containers are porous and allow for aeration of the roots.*

Mildred L. Thompson

Begonias are a fascinating group of plants. The growth habits of begonias vary greatly. The stems can be erect, or semierect, trailing, or climbing. The growth can be of the creeping rhizomatous nature, tuberous, or semituberous. Begonias are divided into eight major groups: canelike, shrublike, thick-stemmed, Semperflorens, rhizomatous, Rex, tuberous, and trailing/scandent. Within these groups, there are many different leaf shapes and sizes, seemingly endless leaf colors and color patterns, and various sizes of flowers and flower clusters. Most begonias are seasonal bloomers, but some are everblooming. The overall size of begonias ranges from miniature to those that grow to 15 feet in height.

This heterogeneity intrigues growers and is undoubtedly the reason that there are over 3,000 different species and cultivars of begonias grown today. This diversity plus the general ease of growing result in an extraordinary group of plants that can be grown and

Mildred L. Thompson has been growing and researching in the begonia field for over 25 years. She has written many articles and a definitive book on the subject. Along with her husband she grows over 1600 varieties of begonias.

Begonia *'Preussen' is a shrublike begonia. It is covered throughout the year with vibrant pink flowers on red stalks contrasted by olive-green foliage.*

enjoyed in the home, fluorescent light garden, greenhouse, or outdoor garden.

The following cultural guidelines will be appropriate for most begonias. The ideal temperature range for growing begonias is between 58 and 72° F.; they will tolerate much lower and much higher temperatures, but they will not grow at their best. All begonias require plenty of light and/or sunlight in varying degrees to develop into strong, vigorous plants. Grow begonias where the relative humidity is between 40 and 60%. Some unusual begonias with thin foliage may require additional humidity, easily provided in terrariums.*

*Ed. Note: For example the dwarf hybrid "Buttercup" does best in a terrarium.

The potting mix I find successful is: 1 part perlite, 1 part sphagnum peat moss, 1 part soilless mix (under various trade names at garden centers), and 1 part sterile topsoil. Bulb pots make the best containers because begonias are shallow-rooted plants. I prefer to use clay pots or moss-lined wire containers because they are porous and allow aeration of the root system. Good root develpment is the basis of growing specimen plants. Regardless of the type of containers used, repot only when the root system fills the container, and then move only to the next size container.

Proper watering practices are essential for the long lasting health of the plant. When the surface of the soil is dry to touch (not "bone dry"), soak the mix thoroughly until water comes out the drainage hole. If saucers must be used, allow the water to drain after watering, and then remove the saucer. Overwatering promotes root rot and the loss of leaves, especially the lower ones.

A regular schedule of fertilizing is imperative not only for vigor, but also for the beauty of the plant — good leaf and flower coloring. A complete fertilizer, preferably the liquid type, should be used every three weeks during the active growing season, and every six to eight weeks during the winter months if the begonias are grown within the ideal temperature range and in plenty of light and/or sunlight. If the begonias are in a dormant or semidormant state, do not fertilize until active growing resumes.

In the following section I have selected eight easy-to-grow begonias, one from each of the eight major groups. With each, I have included some of the special needs for that particular group of begonias.

***B.* 'Tom Ment'**, a spectacular canelike begonia, has been a favorite among begonia growers ever since it was introduced by Tom Mentelos in 1973. It is a result of crossing two floriferous begonias, 'Di-Erna' and 'Orange Rubra'. It has large glossy deep green leaves highlighted with large silver spots sprinkled over the upper surface. The deep red undersurface of the leaves adds further color. The margins of the leaves are wavy and slightly cut. Many bamboolike stems develop at the base of the plant, and tend to grow in a graceful semipendulous fashion; staking is seldom necessary. *B.* 'Tom Ment' grows into a full plant in a relatively short period of time. Large pendulous clusters of mandarin orange flowers adorn this begonia throughout the year. It reaches two to three feet at maturity.

There are a few uncomplicated guidelines to follow for this begonia, and other canelike begonias. It is crucial to provide at least four to six hours of sunlight daily for the maximum flowering. Characteristically, canelike begonias are somewhat bare at the base of the plant; nevertheless, when the lower leaves of canelike begonias fall, it is usually because the plants have been overwatered. Many canelike begonias, especially those over three feet tall, need staking in order to get a truly symmetrical shape. In late fall, prune the old woody stems by cutting them back to the third or fourth node; this causes new basal shoots to develop thereby making the plant fuller.

***B.* 'Preussen'** is a popular and easy-to-grow shrublike begonia that is believed to have originated in Germany. It is a compact, bushy plant that sends up many basal shoots, and the thin green main stems are branched. The numerous small, dark olive-green leaves measure about three inches by two inches and, occasionally, the leaves are highlighted with small silver spots; the undersurface of the leaves is tinted purplish-red. The red leaf stems are short which adds to the compact appearance of the plant. Throughout the year, 'Preussen' is covered with large, pendulous many-flowered clusters of vibrant, medium pink flowers that contrast with the red flower stalks and olive-green foliage. This plant grows to about two feet tall at maturity.

Like many of the small-leaved shrublike begonias, 'Preussen' is lovely when grown in a hanging container with stems cascading over the sides while others grow erectly. This type of begonia never needs staking. To keep small-leaved shrublike begonias compact, pinch some of the growing tips periodically and remove any of the older woody stems to allow new growth to develop. To ensure blooming for most of the year, provide abundant sunlight and/or filtered sunlight.

***B.* 'Perle de Lorraine'** is an exquisite winter-blooming thick-stemmed begonia developed in 1901 by Victor Lemoine, a commercial grower in France. It has glossy medium green leaves marbled with chocolate; the undersurface of the leaves is a paler green with maroon marbling. Branching along the main stems creates a bushy plant. From February through April the plant is covered with numerous clusters of soft pink flowers. At maturity 'Perle de Lorraine' is two to three feet tall.

It is essential to provide plenty of sunlight summer through April. Overpotting will accentuate its tendency towards leggy growth so it is best to allow the plant to become slightly rootbound before repotting. 'Perle de Lorraine' will be most attractive if it is grown with the main stems staked and side branches allowed to grow in a graceful pendulous fashion. All thick-stemmed begonias need staking even though, in most cases, the stems are stout and thick enough to support their own weight. Staking will ensure stately erect growth which is one of the outstanding characteristics of this particular group.

***B.* 'Charm'**, a striking Semperflorens begonia, was developed in 1948 as a chance seedling of a mutation. It was introduced by

Logee's Greenhouses. The variegated foliage is the most captivating feature of this cultivar; the medium green leaves are splashed with white and yellow. If it is grown in direct sunlight, the leaves will be edged with a deep pink. This low-growing plant is naturally compact because it develops many basal shoots, and it branches along the stems. Pink single flowers are abundant throughout the year. 'Charm' makes a sensational colorful basket plant in all seasons.

Most variegated Semperflorens begonias need protection from direct sunlight particularly during the summer; 'Charm' is an exception. It will be much more attractive if it is grown in lightly filtered sunlight or in a few hours of direct sunlight. Semperflorens begonias need periodic pinching of the growing tips to remain full through all stages of growth.

***B.* 'Oliver Twist'**, an exceptional rhizomatous cultivar, was developed in 1978 by Logee's Greenhouses as a result of crossing 'Madame Queen' and *B. carrieae,* a Mexican species. The most irresistible feature of this begonia is the foliage, medium-sized leaves are ruffled, crested, and highlighted with short white hairs around the leaf margins. The satiny, bronze-green leaves are accented with light bronze-green along the red-spotted veins. The plant is compact with leaves close together. Clusters of pink flowers rise above the foliage in the spring.

Provide sunlight during the late fall to early spring so that the plant will bloom to its full potential. During the summer months the sun's rays must be filtered to prevent fading of the foliage. Most rhizomatous begonias bloom in winter and early spring. It is important not to get water on the leaves, especially those with crested leaves, because this will cause rotting.

Use clay bulb pots or moss-lined wire containers for potting all rhizomatous begonias. Repot only when the root system fills the container so that the plant will remain compact. Pinch the growing tips or terminal buds of the rhizomes to increase branching along the rhizomes. Cut back bare portions to where there is foliage. When all the rhizomes near the edge are foliage laden, allow them to spill over the edge. This will result in the spectacular shape which creates a specimen plant.

***B.* 'Helen Teupel'**, an exquisite low-growing Rex begonia, was developed in 1928 by Schmeiss in Germany, and has been an easy-to-grow favorite over the years. The leaves are egg-shaped, with wavy margins and pointed lobes — deep garnet blending into a deep green outer band outlined with garnet. The outer half of the leaf is heavily splashed with silver between the main veins. The undersurface of the leaves is mahogany red and dark green. 'Helen Teupel' is a creeping rhizomatous-type Rex begonia with foliage-laden rhizomes spilling over the sides of the container. At maturity the plant forms a ball-like shape, making it especially attractive in a hanging basket.

Rex begonias have flamboyant ornamental foliage. Like most Rex begonias 'Helen Teupel' prefers a higher humidity, over 45%, and a temperature of 65 - 72 °*F.* Rex begonias should be grown in bright light without direct sunlight except in the early morning or late afternoon. If the plant becomes one-sided, pinch the tips of the rhizomes to force growth in the other direction. This advice applies to all rhizomatous type begonias including rhizomatous Rex types. Avoid overwatering and overpotting.

B. partita, a lacy-looking semituberous species, was originally collected in South Africa in the late 1800's. *B. partita* did not come to this country until 1978 when a commercial seedsman sent me seeds that had been collected in Natal, South Africa. The plant has small medium green, deeply cut maple-shaped leaves highlighted with red-tinted veins, reddish stems and petioles. It is full and naturally bushy. There is a large semituberous formation at the base of the plant. White flowers adorn this particularly interesting species from spring through the fall. The mature plant is about two feet in height. Be certain never to overwater because the semituberous formation will rot. When it is very humid and cool, this begonia is susceptible to powdery mildew; if this occurs, spray with a fungicide immediately to prevent widespread damage. To maintain a full and bushy plant, pinch the growing tips at fairly regular intervals to induce branching. *B. partita* prefers to be slightly rootbound, and this feature makes this group of species especially

suitable for growing in rock and driftwood plantings. In addition, these semituberous species can be trained into handsome sculptured plants. Their maple-shaped leaves create the appearance of small trees and the semituberous formation adds to the sculpted effect. These tuberous species go into a semidormancy during the winter months if the temperature in the growing area falls below 60°. If this semidormancy occurs, water sparingly and stop fertilizing until active growth starts, (usually when temperatures become higher).

B. solanantbera is a beautiful trailing species from Brazil where it was first collected in the mid 1850's. This species has many trailing woody stems about two feet in length with much branching along the stems. The heart-shaped leaves are a rich medium green, about two to three inches long by one and a half to three inches wide. In the winter, the plant is covered with clusters of sparkling white flowers with crimson centers highlighted by the vivid yellow of the anther of the male flower and the style and stigma of the female flower. Each flower cluster has eight to ten flowers which protrude slightly beyond the foliage. The flowers are fragrant.

The long trailing stems enable the plants to be grown beautifully in hanging containers. To insure a compact plant, pinch the growing tips of the newer shoots to induce branching along the stems. Pinching should be started in the early stages and continued through the entire life of the plant. As the plant matures, cut back the old, bare woody stems closest to the basket so that the newer growth can take over. Plenty of winter sunlight is required for this species to bloom abundantly.

I have mentioned above the most important guidelines for growing begonias. With study and experience, each grower will develop a sense of the individual needs of each plant.

Begonias can be propagated easily from leaf cuttings. This single leaf of B. *'Gay Star' produced a clump of plantlets.*

Top: Schlumbergera *'Gold Charm' often flowers in both winter and spring.*

Gymnocalycium mihanovichii *v.* friedrichii *has attractively marked stems with abundant pink flowers.*

Photo by Job

Succulents for Indoor Growing

John N. Trager

Few of us live in climates mild enough to grow succulents outdoors. When cultivated, these plants are therefore usually restricted to conservatories, smaller greenhouses, clustered on sunny windowsills, or under artificial light. Conservatories in botanical gardens can afford space for some of the more imposing succulents. The average collector, however, must make do with much less space. Many succulents oblige with appropriately subdued growth or lilliputian proportions. Such miniatures are suited to limited space and their exotic forms and remarkable flowers are better appreciated when placed on a shelf or windowsill closer to eye level.

Some succulents are demanding in their cultural requirements and will not achieve their full potential indoors. This is an understatement for those of us who have labored only to find our treasures smothered with pests or collapsed in a heap of rotten mush.

These and most other problems encountered in growing succulents can be prevented or even cured. By providing certain basic growing conditions and selecting adaptable species, one can raise healthy specimens. Of the 10,000 species of succulents, only about 3% are suitable indoor plants.

While more complete information is available elsewhere, a few basic points about cultivation of succulents are worth reviewing.

Light: The limiting factor for growing succulents indoors is usually light. Few succulents will look their best with less than three or four hours of direct sun a day. Plants grown in less sunny areas should have supplemental light from an artificial source that provides a complete spectrum. The effectiveness of artificial light dissipates quickly with distance from its source. Therefore, succulents must

Crassula *'Buddha's Temple' is grown mostly for its attractive foliage as are other members of this family.*

John Trager, Horticulturist of the Desert Garden Conservatory at the Huntington Botanical Gardens, is a writer, lecturer, and photographer of succulents. His work appears in the "Cactus and Succulent Journal," the "Euphorbia Journal," and the Abbey Garden catalogs.

Aloe bellatula *has coral pink bell-shaped flowers. This species has a dwarf growth habit so it is suitable for a three- to four-inch pot.*

be placed at close range (four to six inches) in order to benefit.*

Watering: When actively growing, succulents should be watered thoroughly, then allowed to dry until the soil is barely damp before watering again. Soil moisture below the surface can be determined by probing with a toothpick or the plant's name tag (which is also handy if you can't remember names). If allowed to dry out completely, feeder roots will die. These will harbor rot which may spread to living tissue.

Feeding: Plants grown in low light will require little if any feeding. Periodic repotting will provide enough nutrients as well as the opportunity to inspect roots and prune off any that have died back during the dry winter dormancy period. Plants grown in a brightly lit greenhouse will require regular feeding for optimal growth. The best fertilizer is a dilute solution of low nitrogen fertilizer (¼ strength of a fertilizer with 5-10% nitrogen, 5-10% phosphorus and 5-10% potassium) with every watering during the growing season.

Dormancy: Most succulents require a dry, dormant period in winter—water lightly or not at all. Dormant plants don't absorb water and soggy soil may lead to rotting. One unavoidable side effect of this rest period is the natural dieback of roots. As already mentioned, however, an annual or biennial spring repotting and root pruning will take care of this problem and stimulate fresh growth. Cut root ends should be allowed to dry in the open air for several days before repotting or, if potted immediately, not watered for a week or so.

Pest Control: Another frequently encountered problem resulting from incomplete watering is root mealybug harbored in dry pockets within the rootball. Mealybugs are small, cottony-looking insects which suck plant juices from roots and other parts. Above the soil they are easily removed with a forceful jet of water or a toothpick. Below the soil, root mealybugs must be controlled with a drench of systemic insecticide. One drenching in spring and one in fall will usually keep mealybugs in check.

The only other common pest of some succulents is spider mites. These nearly microscopic arachnids suck juices from the leaves of thin-leaved succulents such as adeniums and occasionally from soft-stemmed cactilike rebutias. The early symptom is minute, yellow flecking on the leaves. Heavy infestation results in a fine webbing over the surface of the leaves which upon examination with a magnifier will be seen to be crawling with the little reddish mites. Rebutias, unfortunately, don't show symptoms until the epidermis becomes irreparably scarred and corky over the entire stem. Commercial miticides are usually quite effective against mites.

*Ed. note: We recommend the conservative approach in controlling pests. Keep plants healthy and clean, inspect often and use insecticidal soap if necessary—not commercial sprays.

Succulents for Form and Flowers

These guidelines alone will not ensure success. One must select the right plant for the right place. Indoor growing conditions are

*Editor's Note: See feature *Houseplants Under Lights* on page 82.

usually somewhat different than plants are accustomed to in the wild. Therefore, adaptability is an essential characteristic for indoor succulents. What follows is a brief selection of some of the more interesting succulents, ones which are better adapted than most to growing indoors. They are chosen for their general availability from nurseries specializing in succulents, their reasonable cost (most under $10), adaptability to indoor conditions and their desirability. The last criterion refers to their beauty, intriguing forms or flowers or a combination of these attributes.

Succulents for Form

Caudiciforms: One group of succulents grown for their often bizarre or grotesque forms is the caudiciforms. These plants have unusually thickened, non-green stems or roots. Often the caudex develops underground but can be raised gradually with each successive repotting. *Adenium obesum,* for example, develops a marvelous caudex of stem and intertwining roots and has the added attraction of beautiful, pink, bell-shaped flowers. *Fockea edulis* has inconspicuous flowers, but its caudex becomes magnificently obese, covered with a knobby, silvery skin. *Pachypodium lealii* ssp. *saundersii* has smooth, silvery skin, particularly in the new growth, as well as delicate, white pinwheel flowers in the fall.

The succulent ficuses, *Ficus palmeri* and *F. petiolaris,* have green, heart-shaped leaves, with red veins in the latter species. Both have succulent trunks and roots that can be trained over a rock in bonsai fashion. They develop a flaky bark, resembling old, weathered wood with peeling varnish. The weathered effect is even more pronounced in *Cyphostemma juttae* in which the bark peels off in sheets. In seemingly out of place juxtaposition are its large fleshy leaves which are covered with a waxy coating like the "bloom" of a fresh plum. *Senecio tuberosus* has similarly waxy, but much more proportional leaves atop its stems which emerge from knobby, jointed tubers that can be raised to make an interesting miniature bonsai. The caudiciform mass often has natural arches through which one can peer. The roots of *Trichodiadema bulbosum* resemble a cluster of contorted carrots. Its leaves are tipped with starlike clusters of stiff hairs and the plant is further ornamented for several weeks in summer with half-inch magenta flowers.

Some euphorbias have tuberous roots that can be exposed as a caudex. Some, like *E. tortirama* and *E. groenewaldii,* have twisted, corkscrewlike branches as well.

Other Stem Succulents: Other succulents, while not caudiciforms, can also be grown indoors for their exotic stem forms. Many cacti, for example, have pleasingly symmetrical stems, either columnar or globular, and ornamented with intricate spine clusters arranged in rows along ribs or in spirals. *Espostoa lanata* is a columnar cactus with ribbed stems, though these are barely visible as they are densely clothed in a cottony fur produced among the small spines and concealing them. Another white-hairy columnar cactus is *Oreocereus celsianus.* Its hair, however, is coarser and doesn't hide the thick

Rhipsalidopsis rosea *is a dwarf epiphytic jungle cactus that bears light pink flowers.*

awllike amber-colored spines. While these two white-haired cacti are somewhat different than the better known "Mexican Old Man Cactus," *Cephalocereus senilis,* they are better suited to indoor growing than the "Old Man," which is rather temperamental about overwatering.

Another cylindrical-stemmed cactus grown for its form is *Borzicactus aureispinus,* whose one-inch thick stems are covered with short yellow spination almost furlike in its density. The stems branch from the base and droop, creating a wonderful hanging basket plant for a window where backlighting will show off its beautiful spination. The freely produced, coral-pink flowers are an added bonus to this adaptable cactus.

Globular cacti are either smooth-stemmed or tubercled with the spine clusters born on these raised mounds. *Coryphantha humamma,* for example, has bold clusters of clawlike, recurved spines surmounting equally bold tubercles.

Many of the euphorbias are superficially similar to the cacti in their vegetative form. *E. polygona* 'Snowflake,' for example, has columnar, ribbed stems with a thick, waxy white epidermis, while *E. obesa* has a globular, striated stem resembling a hot-air balloon in miniature.

A completely different sort of stem form is seen in *Senecio pendula,* the "Inch Worm Plant," which undulates in and out of the soil in a manner reminiscent of its namesake.

Succulents for Foliage: Among the succulents grown primarily for their foliage are several hundred species of the crassula family. The genus *Crassula,* for example, includes *C. falcata* with four-ranked, bladelike, grey-green leaves arranged in propellerlike fashion. This species has been hybridized with many other *Crassula* species resulting in myriad, marvelous foliage forms. Perhaps the choicest of these is the hybrid with *C. mesembryanthemopsis* called *C.* 'Morgans Beauty.' While the brilliant scarlet flower color of *C. falcata* usually washes out when crossed with paler flowered species, this hybrid with the white-flowered *C. mesembryanthemopsis* has resulted in a compact plant with overlapping, sculptured leaves and clusters of bright pink flowers with a honeylike perfume.

Another group that has lent itself to hybridization is the dwarf aloes of Madagascar. *Aloe descoingsii,* with its nearly ever-blooming habit, crossed with a variety of beautiful foliage plants like *A. rauhii* and *A. parvula* has resulted in some floriferous hybrids with beautiful rosettes of leaves and some rather humorous names like *A.* 'Lizard Lips.'

The related haworthias also have decorative rosettes of leaves and are ideal houseplants by virtue of their tolerance for shade. Some like *H. retusa* and its allies have translucent "windows" in the upper surface of the leaves which make them appear as though cast of green glass. Others like *H. nigra* are opaque, with rigid leaves arranged in elegant, three-sided towers, as though sculpted of dark jade.

One of the best euphorbias for foliage is *E. neohumbertii,* which, in addition to its beautifully marked stem, has broad paddle-shaped leaves during spring and summer. It is remarkably shade-tolerant with the leaves growing larger in low light. *Hoya kerrii* has similar, but thicker and heart-shaped leaves that persist the year round.

One group of foliage succulents that has lured many into attempting to grow them are *Lithops* or "Living Stones." Their fused pairs of stonelike leaves come in a remarkable variety of intricate patterns and are replaced by a new pair annually. The rule of thumb in lithops culture is to water only when they begin to shrivel, and then lightly. However, when the new leaves are emerging in winter, they derive all their needed moisture from the old leaves which undergo a natural shrivelling as they are absorbed.

Succulents for Flowers

The ultimate goal of any horticulturist is to have a plant flower. In addition to those flowering species already mentioned, there are many other succulents that flower as well. Their flowers are often all the more remarkable for their contrast to the unusually shaped plants from which they emerge.

Ceropegias, on the other hand, have flowers that are seemingly unreal. These bizarre, ornamented, vaselike structures are designed to attract fly-pollinators as are the notorious "carrion-flowers" like *Stapelia*

Dwarf creeping Sedum dasyphyllum *is grown here in a small bonsai pot. The leaves are glaucous blue.*

nobilis which emit an odor like that of rotting flesh from their six-inch hairy flowers. While *S. nobilis* is not suited as a centerpiece for the dining room table by virtue of its scent, *S. flavopurpurea* has delicate, two-inch, yellow flowers with a sweet, honeylike fragrance. The related huernias have no scent at all to their wonderful array of flowers, some of which (*H. hystrix*) are covered with rasplike teeth. Others, like *H. zebrina,* have a prominent, raised buoylike ring in the center.

Some cacti have nocturnal flowers with a delicious perfume designed to attract moth pollinators. For those collectors who work days and can only enjoy their plants at night, these plants have a special appeal. Among the choicest night-flowering cacti are *Echinopsis subdenudata* and the *Discocactus* species, all with white flowers, and *Arthrocereus rondonianus* which is unusual among night-bloomers for its pink flowers.

Succulents for Indoor Growing

The preceding whirlwind tour of succulents gives only a hint of the remarkable variety of species that can be grown indoors. In the absence of space to discuss and illustrate all the possibilities available to the collector of indoor succulents, the following list will serve as a guideline for future acquisition of other succulents for form and flowers.

□ = caudiciform stem and/or root
■ = desirable for the feature indicated

Plant	Stem	Foliage	Flowers
Adenium obesum	□		■
Agave polyanthiflora		■	
Aloe 'Lizard Lips'		■	■
Aloe albiflora			■
Aloe bellatula			■
Aloe descoingsii		■	■
Aloe haworthioides v. *aurantiaca*		■	■
Aloe parvula		■	
Aloe rauhii		■	■
Aloe rauhii 'Snowflake'		■	■
Aloinopsis schooneesii	□	■	
Arthrocereus rondonianus	■		■
Beaucarnea recurvata	□		
Begonia venosa	■	■	
Borzicactus aureispinus	■		■
Ceropegia species			■
Ceropegia woodii		■	
Clusia rosea		■	
Coryphantha bumamma	■		■
Coryphantha elephantidens	■		■

Plant	Stem	Foliage	Flowers
Coryphantha minima	■		■
Coryphantha missouriensis v. *caespitosus*	■		■
Cotyledon species		■	■
Crassula species		■	■
Cyphostemma juttae	□	■	
Dioscorea species	□	■	
Discocactus species	■		■
Dorstenia species	■	■	
Echeveria species		■	■
Echinopsis subdenudata	■		■
Epiphyllum crenatum 'Chichicastenango'	■		
Epiphyllum hybrids			■
Espostoa lanata	■		
Euphorbia aeruginosa	■		■
Euphorbia clavigera	□		
Euphorbia decaryi		■	
Euphorbia flanaganii	■		
Euphorbia greenwayi (blue form)	■		■
Euphorbia groenewaldii	□		
Euphorbia horrida	■		
Euphorbia leuconeura	■	■	
Euphorbia lophogona	■	■	■
Euphorbia millii v. *imperatae*			■
Euphorbia millii v. *tananarive*			■
Euphorbia neohumbertii	■	■	■
Euphorbia nivulia			
Euphorbia obesa	■		
Euphorbia persistens	□		
Euphorbia polygona 'Snowflake'	■		
Euphorbia pugniformis	■		
Euphorbia squarrosa	□		
Euphorbia suzannae	■		
Euphorbia tortirama	□		
Euphorbia trigona	■		
Euphorbia vigueri v. *ankarafantsiensis*	■	■	■

Plant	Stem	Foliage	Flowers
Ficus palmeri	□		
Ficus petiolaris	□	■	
Fockea edulis	□		
Gasteria species		■	■
Graptopetalum species		■	■
X *Graptoveria* 'Silver Star'		■	
Gymnocalycium species	■		■
Haworthia species		■	
Hoya kerrii		■	
Hoya species		■	■
Huernia species			■
Kalanchoe beharensis	■	■	
Kalanchoe blossfeldiana			■
Kalanchoe species		■	
Lithops species			■
X *Lobiviopsis* hybrids		■	■
Mammillaria bocasana	■		■
Mammillaria bombycina	■		■
Mammillaria carrettii	■		■
Mammillaria coahuilensis	□		■
Mammillaria elongata	■		
Mammillaria glassii v. *siberiensis*	■		■
Mammillaria guelzowiana	■		■
Mammillaria haageana (M. elegans)	■		■
Mammillaria hahniana	■		■
Mammillaria humboldtii	■		■
Mammillaria microhelia	■		■
Mammillaria plumosa	■		
Mammillaria saboae v. *haudeana*	■		■
Mammillaria surculosa	■		■
Mammillaria zeilmanniana	■		■
Monadenium coccineum			■
Monadenium magnificum	■	■	

Plant	Stem	Foliage	Flowers
Monadenium montanum v. *rubellum*	□		■
Neochilenia napina	■		■
Notocactus crassigibbus	■		■
Notocactus graessneri	■		■
Notocactus haselbergii	■		■
Notocactus leninghausii	■		■
Notocactus magnificus	■		
Notocactus mammulosus	■		■
Notocactus minimus	■		■
Notocactus ottonis	■		■
Notocactus rechensis	■		■
Notocactus scopa	■		■
Orbea variegata			■
Oreocereus celsianus	■		
Orostachys species		■	■
Pachypodium baronii ssp. *windsori*	□		■
Pachypodium brevicaule	□		■
Pachypodium geayi	■	■	
Pachypodium lameri	■	■	
Pachypodium lealii ssp. *saundersii*	□		■
Pachypodium succulentum	□		■
Piaranthus foetidus v. *purpureus*			■
Rebutia species	■		■
Rhipsalis species	■		■
Sansevieria species		□	
Senecio pendula	□		□
Senecio rowleyanus		□	
Senecio stapeliiformis	□		□
Senecio tuberosus	□		
Stapelia species			■
Tacitus bellus			■
Thelocactus bicolor	■		■
Thelocactus schwarzii	■		■
Trichodiadema bulbosum	□		■
Zamicoculcas zamiifolia		■	

Photo by John V. Trager

Zamioculcas zamiifolia *is a foliage plant that is very tolerant of low light.*

Editor's Note:

The genera and species of cacti occurring in the United States and Canada are defined differently by the authors of various books and papers. Discrepancies like this do not reflect necessarily errors or mistakes in judgment but, rather, differences of opinion concerning policy in classification.

Each botanist attempts to classify plants in a uniform manner, and no system is necessarily "right" or "wrong," provided that the organisms are grouped according to natural relationships and the arrangement is essentially consistent.

There is no comprehensive coverage of the cactus family according to conservative policy.

—excerpted from The Cacti of the United States and Canada *by Lyman Benson, Stanford University Press, 1982.*

Growing Bromeliads

Adapted from an article by George Kalmbacher originally published in Plants & Gardens, *Vol. 28 No. 3 1972*

Bromeliads are striking plants and easy to grow indoors. Their flower complexes are eye-catching and will last in good condition for a few months. This long-lasting quality of the beautiful inflorescence and succeeding berries, typical of many bromeliads, is not equaled in any other group of houseplants.

A great proportion of bromeliads grow in trees in the American tropics, the trees serving simply as a perch. Bromeliads do not derive nourishment from their hosts, but manufacture their own life-materials from the abundance of air-borne particles and debris of decaying plant and animal life. So they are not "parasites," and do not bore into their living hosts and suck out vital juices as do parasites.

Living up in the air, perched on other plants epiphytic bromeliads have evolved to a state unique among plants—one that presents two radical changes. The primary purpose of their roots has come to be fundamentally that of support. Their roots are so firmly attached to their hosts as to become practically cemented, and sometimes the area of attachment is very small compared to the size of the plant. The absorptive function of roots has been taken over by small white scales of complicated structure that act like sponges. In some tillandsias, the whole leaf is densely covered with scales. In other bromeliads the scales are in broad bands attractively alternating with greenish bands. In fact, many of the cultivated kinds, even without flowers, are delightful the year around as foliage plants because of markings, spotting, coloring, banding and striping. Foliage attractiveness is further advanced by the introduction of "variegation" to normal leaves. This is the appearance of patches or lines of color which can be shades of yellow or pink or other color, or white. Variegation of bromeliads is usually in longitudinal stripes.

Most of the bromeliads grown as houseplants are of a kind that might be called "water-tanks." These consist of large wide leaves spirally and closely arranged to form elongated receptacles that will hold water without leaking. In some cases water will be further retained in lower leaves that form basal scoops. The sides of the leaves in contact with the water take the place of the absorptive rootlets in other plants, drawing water and dissolved mineral and organic matter necessary for the life-processes of the plants. When applying fertilizer, use the liquid form in the case of the "tank" plants and place in the water of these cups. In nature all sorts of animal and plant debris finds its way into these cups and decays there. When fully broken down, the minute resultants become part of a new cycle of life. This is compost at an aerial level. Some animals live, some die in these tanks. In addition, particles of dust or larger matter, floating in quantity in those tropical areas, fall into the plants' "broth" to supply mineral and organic substances.

Epiphytic bromeliads, like these aechmeas growing on an oak tree outside of Chichen itza's Mayan Temple in Yucatan, require good air circulation around their roots and water in the cups.

George Kalmbacher served for many years as Taxonomist at Brooklyn Botanic Garden. He took a particular interest in cacti, gesneriads and bromeliads.

In the forested tropics with their year-round activity and vast wealth of organic life, ephiphytic plants are a characteristic part of the scene. Not only bromeliads, but their companions—orchids, cacti, ferns—are scattered about, sometimes thickly, other times only lightly.

In strange contrast, there are in desert regions of tropical America, a few kinds of epiphytic bromeliads attached to large cactus plants. And there are also bromeliads that are not epiphytic at all. Some grow on rocks as their regular habitat, some in soil. Of these three types, there are a number that have become unusual subjects for cultivation in homes, greenhouses and outdoors where the climate is warm enough. In fact, outdoor growing, not surprisingly, makes the healthiest plants. If possible, put your bromeliads outdoors when weather is no longer hazardous for them; hang them up in trees or place them under trees where the shade is not dense—and bring them back before cold weather sets in.

Bromeliads have a common system of vegetative multiplication. From seed comes a rosette which will flower in time, but as it grows, it develops low branches or rhizomes, each of which in time develops its own rosette which eventually can be cut off and rooted to become a new plant. Flowering arises from the center of the mature rosette, as a final act, after which it gradually dies. These offsets are commonly called "pups," a term also used in cactus growing. They are usually stocky. Do not cut them off from the mother plant until they are a few inches long.

The most reliable genera for beginners to start with are the aechmeas and billbergias. They want good light, and need only water in their cups. The aechmeas are remarkable for their long lasting flower and berry complexes, sometimes in large panicles. The flowers are small and not nearly as showy as the billbergias, but produce berries without obvious pollination. These solid full berries go through color changes that are highly pleasing, and which altogether last for a few months. One common color range is in the metallic wine-reds with a very glossy finish.

Some species are found in nature that are typically green, but have varieties that are dark red on both sides of the leaf, or sometimes only on the underside. The leaves are usually large, and the habit upright and cup-shaped. They require a very porous growing mixture—no soil but plenty of fibre, some inert material such as river gravel, coarse perlite or granite chicken grit, and organic material such as leafmold. It is not necessary to carefully measure the amounts of each, but a heavy proportion of fibre is advisable. In with the mix, scatter Osmocote, a fertilizer consisting of small round beige particles that disintegrate over a long period of time—actually about six months. Among the aechmeas, the following are well-known: *A. chantinii, fasciata, fulgens* and its variety, *discolor, gamosepala, lueddemanniana, miniata* and its variety *discolor, orlandiana, racinae* and *tillandsiodes.* There are also colorful hybrids.

Aechmea fasciata *is remarkable for its long-lasting flower and berry complex.*

The billbergias require similar culture, but are distinct from the aechmeas in that their tubular flowers are richly colored, larger and very obvious. They come in loose racemes or panicles on long stalks. They put on a show,

which, however, lasts only about a week. Since they grow freely and abundantly, clumps develop if undisturbed, and when a number of rosettes in a clump come into flower, it can make a truly grand picture. The very easy and popular *Billbergia nutans* is a great favorite.

Unlike the aechmeas, billbergias do not usually produce seeds in cultivation but hybridize rather easily in nature. Some offspring are not especially distinctive.

Neoregelias and nidulariums should be given the same regimen as the billbergias and aechmeas, except that being softer-leaved, they require a little less light. Both kinds are more open plants, ranging from fairly upright to flattish in habit. They are often considered together because of the colorful areas in the foliage that develop before flowering time, and become more pronounced during the flowering period, which may last for a couple of months or more. In the neoregelias, the flower complex is a large disc in the center, from which single or a few flowers arise at a time over a long period. In the nidulariums, the inflorescence is at the top of a stout stalk with colorful bracts or floral leaves intermixed. The flower stalk may not be obvious.

Among the most striking kinds are the vrieseas, but they are delicate to a certain extent. The inflorescences with their bracts, which are often colored rich dark red, enclose individual flowers that bloom one at a time. They are often upright, flattened long spikes. If they are packed tightly in four-inch pots with fern fibre and nothing else, they may not give any trouble, since the drainage is perfect and they will not suffer from water damage, which is probably the great hazard to their successful culture.

There are more tillandsias than any other kinds. Most of them have long, very narrow leaves. A number of tillandsias are attractive for their foliage because of the thick coating of tiny silvery scales. They, like the closely related vrieseas, are very susceptible to water remaining about the roots and plant base, and are best mounted on cork, fern bark or driftwood, with only some fern fibre close around

Guzmania lingulata *has bold red flowers above a rosette of dark green leaves.*

Vriesia *'Nova' requires at least two square feet of space when fully mature. Olive-green leaves have white bars and flowers are produced on erect inflorescences with green bracts.*

the base. They can be securely fastened by putting a little Duco Cement on the wood or bark at the point where the plant is to be attached, and setting the base of the plant in the cement. It takes a short time to dry and then holds the plant in place, where it can proceed to grow a few roots in the manner of tillandsias. They thrive with very little root development. Tillandsias do best in cultivation with misting. Give a good soaking once a week. They do well without fertilizer.

All the above mentioned bromeliads do best in a humid environment. But care must be taken not to overwater—they can withstand dryer conditions than one would expect.

Some Terrestial Bromeliads

Cryptanthus are terrestials, some flattened like stars, and a number have unusual coloring not found in the other genera. They usually have white flowers low in the center of the plant. They do best with the same mixture as the epiphytes if given less water. They do require humid surroundings.

Bromeliads are remarkably free from pests, but scale can be a problem. These roundish, raised and stationary insects can be easily rubbed off when they first appear—if one is on the constant lookout for them.

Miniature Tillandsia ionantha *blushes red in the center as it produces blue flowers in the spring. Its silvery foliage and diminutive rosettes make it attractive at all seasons.*

"Miniature Lady Palms" for Indoor Decoration

Lynn McKamey

The word "palm" often brings to mind the image of towering plants, crowned with feathery thatches of leaves gently swaying near warm tropical shores. While some palms do have coconuts and monkeys, most do not. Over 3,000 different species exist, and several can grow indoors as easily as in their native habitat. A fine example is *Rhapis excelsa,* a small multi-trunk fan palm native to the subtropical regions of China. It is one of the oldest cultivated palms in the world and has been a popular interior plant for over 300 years.

Elegantly graceful and adorned with richly patterned leaves, *Rhapis excelsa* has acquired the common name "Lady Palm." Rare, slow-growing, and long-lived, it is undemanding and prefers low light. Enchanted by these exceptional qualities, the Japanese first began obtaining "Lady Palms" from China in the 17th century as exclusive possessions for Imperial palaces and the highest levels of nobility.

The fame of this esteemed plant soon reached Europe, and *Rhapis excelsa* became one of the first ornamental palms to survive the long, harsh ocean voyages of the 18th century. It was introduced to European conservatories in 1774, and became a classic American parlor palm and garden accent in the 1850's. Many Victorian homes in the South are still surrounded by thick clumps of *Rhapis* over 100 years old. These early cultivated palms were tall 'standard' *Rhapis excelsa,* often growing more than 14 feet in height and attaining immense width. Consequently, it became known as "Large Lady Palm."

All photos by author

Rhapsis excelsa *'Gyokuho' has a short compact growth habit, small, oval leaves and is a slow grower.*

Lynn McKamey is a director of the International Palm Society. She owns Rhapis Gardens in Gregory, Texas, and specializes in developing new varieties of "Miniature Lady Palms."

'DARUMA'

28" tall, 5 years old, 7" pot

A classic miniature resembling the large "standard" Rhapis excelsa. Shape is tall and upright.

'KODARUMA'

26" tall, 10 years old, 9" pot

This shortest of all Rhapis has slow, compact growth and numerous offshoots. The ultimate mini-palm.

'TENZAN'

30" tall, 5 years old, 7" pot

A fast growing variety with slender form and long drooping leaves. Quite dramatic.

'KOBAN'

26" tall, 5 years old, 7" pot

Distinctively different with wide, oval leaves and a tall, spreading growth habit. Very popular.

Dwarf Varieties of Rhapis excelsa

Common Name:

"MINIATURE LADY PALMS"

'GYOKUHO'

20" tall, 7 years old, 7" pot

A pixie palm with small, oval leaves and a short, bushy growth habit. A favorite of most everyone.

'ZUIKONISHIKI'

18" tall, 9 years old, 6" pot

White and green striped leaves distinguish this as the most vivid variegated.

'ZUIKO-LUTINO'

12" tall, 6 years old, 5" pot

Creamy white leaves with green stripes. From the term "lutino" - white birds with a touch of color.

'KOTOBUKI'

20" tall, 8 years old, 6" pot

White stripes on green leaves make this Lady quite stunning. Tall graceful form with long oval leaves.

As interest in *Rhapis excelsa* continued to expand, Japanese enthusiasts began cultivating new smaller forms of this species, more suited to interior space and their preference for dwarf plants. The shortest, slowest-growing lady palms were selected, cloned and refined to be fully developed specimens only two to four feet tall after decades of growth. Green and variegated sports soon appeared within these miniatures, an unusual occurrence in the palm kingdom! Each new variety exhibited a unique leaf shape, growth habit, and coloration. These outstanding cultivars developed into a splendid group of dwarf *Rhapis excelsa,* collectively called "Miniature Lady Palms."

Over 100 different variegated and green varieties have been named and classified. Though these pedigreed palms can only be propagated by division and remain somewhat scarce, a fascination has developed in the Far East, and dwarf *Rhapis* are in demand as houseplants and fine accompaniment to bonsai. Many Japanese businessmen consider these palms a wise investment and purchase the rarest cultivars as an inflationary hedge. Dwarf *Rhapis excelsa,* a long kept secret of the Orient, was finally discovered by the Western world in the 1960's.

Fortunately for those who love to acquire and grow highly prized plants developed by others, these exquisite palms have now become important additions to interiors and fine plant collections around the globe. The "Lady Palm" charm that captivated those 17th century admirers is still alluring new collectors today. However, modern enthusiasts have the advantage of selecting not only the original standard *Rhapis excelsa,* but also from the vast array of dwarf *Rhapis excelsa* in many green and variegated varieties.

"Lady Palm" Perfection

What virtues could a plant possess to make it popular for more than three centuries? Everyone would like a houseplant which is durable, long-lived, easy to grow and propagate, thrives in low light, and resists insects and disease. Dwarf varieties of *Rhapis excelsa* provide all this, plus being perfectly sized for interior spaces. Those in small pots are excellent table accents, while larger ones make handsome floor specimens.

Of course, nothing is perfect. Price is seemingly the only flaw, since *Rhapis excelsa* are somewhat expensive. Costs are determined by age, size, and rarity. One of the most popular green clones, 'Koban,' ranges in price from $20 for a 14" tall, three-year-old single-cane division to $150 for a 15-year-old multi-cane specimen three feet in height. Variegated forms are available from under $70 for a 12" tall, five-year-old 'Zuikonishiki' to the astronomical cost of over $1,000 for a tiny division of the rarest striped form 'Eizannishiki.'

Undemanding Culture of *Rhapis Excelsa*

Symmetry and Growth Habit: *Rhapis* can be easily admired from all sides, since each cane displays a symmetrical leaf swirl. Leaves radiate in six directions, spiraling up the trunk so the sixth leaf is directly above the first. This interesting feature is most noticeable in young single-cane specimens. As the palm slowly adds new offshoots, it transforms into an ever-spreading, bushy clump of foliage and a continuous source of new divisions.

Light and Growth Rate: *Rhapis excelsa* are native to the shaded forest floors of China. Consequently, they easily adapt to low interior light (i.e. enough light to read this handbook without eyestrain). Light intensity is related to growth rate. In low light, a dwarf specimen will basically maintain its present size, slowly adding only one or two inches of height per year, depending on variety. Bright filtered light enables a dwarf *Rhapis excelsa* to grow slightly faster and generate several new offshoots each year. "Lady Palms" should never receive direct sun which may scorch or yellow leaves.

Size: Because *Rhapis* are so slow growing, selection of size is important. If you like to watch small plants grow (slowly) bigger, then purchase a young division 12 inch to 18 inch tall in a five inch or six inch pot. If you prefer larger, fully developed specimens, dwarf varieties can be found in a vast assortment of sizes up to four feet in height, over 20 years old.

Temperature: The temperature range of these versatile palms is 22° to 100° F (−5° to 38°C). They easily adapt to indoor conditions and most shaded tropical or subtropical landscapes. Popular as patio plants in

northern regions, they require only a brief period of protection during the coldest winter months. *Rhapis excelsa* is one of the few ornamental palm species to offer such widespread indoor and outdoor use.

Humidity: "Lady Palms" accept dry or humid atmospheres, and do not require constant misting, although they appreciate having their leaves gently washed when dusty.

Watering: Proper watering is the most important requirement for a long-lived, thriving *Rhapis excelsa*. These palms must be thoroughly watered (soaked) and then allowed to become almost dry (not quite wilt). Use a shallow saucer with your palm. Water should be applied so that it slowly drains through the soil and fills the saucer. Empty the saucer if it is still full after several hours. In normal house temperatures and average humidity, most *Rhapis* require watering only once a week or so.

Fertilizer: These slow-growing palms require very little fertilizer. Watch the color of the foliage which should be a deep, rich green. When leaves begin to turn slightly yellow, apply soluble houseplant food or fish emulsion mixed in water at one-fourth the recommended rate listed on the container. Wait several weeks to determine if the palm is "greening;" if not, apply another dose at low rates. *Rhapis* grown indoors seldom require fertilizer more than two or three times a year.

Insects: Scale is the only major pest of this species.

Brown Tips: Light brown "fringe" at the end of leaf segments is typical of *Rhapis* and usually occurs on older, lower leaves. Badly burned leaves are usually caused by overfertilizing, improper watering, incorrect pot size, or continuous use of alkaline (hard) water. Slightly damaged leaf tips can be trimmed using a pair of "pinking shears."

Pot Size: A "Lady Palm" prefers living in a pot just slightly larger than its root mass. Overpotted palms tend to stay continuously wet and become subject to root rot, whereas underpotted specimens beg for frequent watering and in protest, can push themselves out of the pot (making thorough watering quite a chore!).

Rhapis excelsa *'Tenzan' is a dwarf variety that is an excellent accent for floor or table. The larger specimen is in a twelve-inch pot while the other is an eight-inch pot.*

Soil: *Rhapis* grow best in a well-drained soil rich in humus, such as African violet mix.

Potting: Proper soil density should be firm—not loose, not packed—and allow water to slowly filter through the pot and into the saucer. Soil level should cover all roots and the base of the canes.

Propagation: *Rhapis excelsa* are easily multiplied by division. Gently remove all soil, select an offshoot with enough roots to fill a four inch or larger pot, and separate from the main cane. Spring or early summer is the best time to divide and repot palms.

Life Expectancy: "Lady Palms" can be lifelong companions, since century old specimens are not uncommon. Old cherished *Rhapis* in the Far East are traditionally divided and shared with the next generation.

Questions Most Often Asked

How Delicate Are *Rhapis?* From their graceful leaves to their sturdy roots, *Rhapis excelsa* are tough little plants. Do not be afraid to repot or divide them. They thrive with minimal care, and endure adverse conditions far better than many plants.

Which are the Most Unusual Varieties? Two very different green cultivars come to mind. 'Kodaruma' is the ideal "mini-palm," staying very short and bushy with small leaves and numerous offshoots. It is the slowest growing variety, and may only attain three feet of height after 30 years of age. 'Tenzan,' in perfect contrast, is an unusually fast grow-

ing dwarf. This tall, slender variety has large, oval leaves with wide segments. With optimum growing conditions, 'Tenzan' can often exceed five feet of height after several decades of growth.

Culture of Variegateds: Variegated forms generally grow only half as fast as green varieties. They require slightly less light, reduced fertilizer rates, and excellent water quality (lest the leaves burn).

"Miniature Lady Palms" are a delight. Treat yourself to one or start a collection. You will find that each variety has an elegant and unique personality all its own.

Rhapis Relatives

Several different species of *Rhapis* are available, but none are as versatile and adaptable to indoor culture as dwarf varieties of *Rhapis excelsa*. To insure the purchase of a genuine "Miniature Lady Palm," look for a tag listing genus, species, and cultivar, such as *Rhapis excelsa* 'Daruma.' If it does not include a variety name, you might be purchasing one of the following *Rhapis* relatives:

The standard *Rhapis excelsa* ("Large Lady Palm") is becoming more common since seed sources have recently been found in the Far East. All large forms are very similar in appearance and do not offer the distinction of having different named varieties. This familiar big sister of the "Little Ladies" can quickly outgrow interior spaces and is best used as a sizeable, durable palm in tropical and subtropical landscapes.

Rhapis humilus ("Slender Lady Palm") can easily grow to towering heights of 18'. Since it is very difficult to divide and does not produce seed, small container specimens are quite scarce and extremely expensive. This species thrives only in cool, subtropical landscapes and seldom tolerates interior use.

Rhapis subtilis ("Thailand Lady Palm") has only recently acquired its correct botanical name and is often confused with dwarf *Rhapis excelsa* or mistakenly labeled *R. humilis*. This small tropical palm flourishes in warm humid landscapes, but quickly deteriorates in interior environments. It is the only species which cannot be divided, is short-lived, extremely susceptible to spider mites, and must be constantly watered. If it dries, it dies. Abundantly grown from seed imported from Thailand, *R. subtilis* is an inexpensive two to eight foot tall plant, easily recognized by its small leaves with pointed tips.

Mail Order Source of Miniature Lady Palms:

Rhapis Gardens
100 Rhapis Road P.O.B. 287
Gregory, Texas 78359-0287

Further Reading:

Secret of the Orient, A Lady Palm Reference by Lynn McKamey. A complete guide to Rhapis palms, 52 pages fully illustrated. Available from Rhapis Gardens, 100 Rhapis Road P.O. 287, Gregory, Texas 78359-0287.

Palm Society

The International Palm Society
P.O. Box 368
Lawrence, Kansas 66044

Rhapsis excelsa *'Chiyodazuru' has green leaves which display narrow, evenly spaced stripes. This specimen is 24 inches tall, nine years old, in a seven-inch pot.*

Comparisons of Dwarf Varieties

Uniquely, *Rhapis excelsa* is the only ornamental palm species with named and classified varieties, each having distinctive characteristics. These miniature cultivars provide an exciting choice of exotic forms and textures which are almost unlimited.

(See following pages)

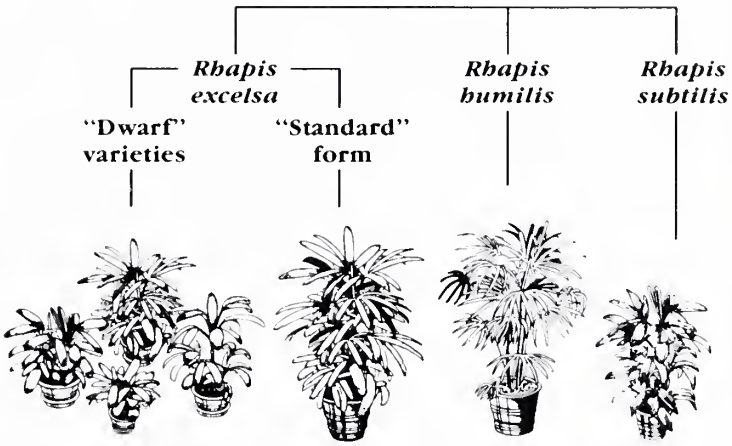
Leaf Shapes and Growth Habits;

Variety Name	Leaf Shape	Growth Habit	Rate of Growth
'Koban'	large, oval leaves	full, spreading	medium
'Daruma'	narrow leaf segments	tall, upright	fast
'Tenzan'	long, oval leaves	tall, slender	very fast
'Kodaruma'	small, twisted leaves	short, bushy	very slow
'Gyokuho'	small, oval leaves	short, compact	slow
'Zuiko-Lutino'	white leaves with green stripes		slow
'Chiyodazuru'	narrow, evenly spaced stripes		medium
'Zuikonishiki'	white and green striped leaves		slow
'Kotobuki'	white stripes on green leaves		fast

Rhapis excelsa *can be easily divided. Spring or early summer is the best time to divide and repot palms.*

Rhapis Palms

Cultivated Species



Common Name	Miniature Lady Palms	Large Lady Palm	Slender Lady Palm	Thailand Lady Palm
Origin	China	China	China	Thailand
Variegated Varieties	yes, many	no	yes, a few	no
Canes	thick, sturdy	thick, sturdy	slender, flexible	varies
Leaf Size—Tip Shape	small—blunt	large—blunt	large—pointed	small—pointed
Segments per Leaf	2-10*	6-14*	10-30*	varies
Leaf Thickness	thick	thick	thin	very thin
Maximum Height	4-5 feet	10-14 feet	15-18 feet	6-8 feet
Temperature Range (F)	22° - 100°	22° - 100°	18° - 90°	30° - 90°
Interior Light	low to bright	low to bright	bright filtered	bright filtered
Humidity Range	20%-100%	20%-100%	40%-100%	60%-100%
Long-lived	yes	yes	yes	yes
Propagated by Division	yes	yes	difficult	no
Propagated by Seed	no**	when available**	no, not available	yes
Pests:				
Scale	yes	yes	yes	yes
Spider Mites	seldom	seldom	occasionally	yes, frequently
Landscape Success:				
in California (cool, dry)	excellent	excellent	excellent	poor
in Texas (extremes)	excellent	excellent	poor	poor
in Florida (warm, humid)	excellent	excellent	poor	good
Interior Success	excellent	excellent	fair	poor
Bonsai Success	excellent	too large	too large	too large
Availability	good	good	very scarce	abundant
Price	expensive	expensive	very expensive	moderate
Rating for Overall Use	excellent	excellent	fair	poor

**The number of segments per leaf increases as the palm adds fronds. All species, except for* R. subtilis, *have a uniform number and width of segments.*

***Seed of standard* R. excelsa *is scarce. Division of dwarf* R. excelsa *is the only reliable method of perpetuating the selected strains of named varieties.*

Gesneriads For Your Indoor Garden

Streptocarpus *'Mini Nymph' bears light blue flowers. It is a good candidate for culture under lights.*

Michael A. Riley

The most recognized genus in the Gesneriad family is *Saintpaulia,* the African violet. The modern hybrids are examples of hybridization at its finest. Great interest is attained with the many variegations and variations in leaf and flower color. The symmetry of growth pattern, the abundance of flowers and the ease of culture add up to the perfect houseplant. If there is a secret to growing saintpaulias, it is simply—consistency. Make them happy and keep them that way with consistent water, light, fertilizer and temperature. This approach to growing seems to hold true for many houseplants, particularly those which are indigenous to geographical areas where the plants experience few seasonal changes in temperature and rainfall. Modern aids to this consistency in culture are fluorescent lights, humidifiers and a variety of watering and potting methods such as capillary matting and wick-well containers. Many gesneriads fit into this same cultural pattern and are therefore equally good subjects for the indoor garden.

Episcia is the peacock genus of the gesneriad family. Episcias' quilted leaves offer an infinite variety of subtle metallic colors. The

Michael A. Riley lives in New York, and is a commodities trader, an amateur horticulturist, writer and photographer. He has collected gesneriads in Ecuador and is currently the president of the American Gloxinia and Gesneriad Society.

African violets and related gesneriads line greenhouse benches at the nursery of hybridizer Lyndon Lyon.

growth pattern is similar to a strawberry plant with runners which may be pinched back for a fuller habit or let trail as desired. *Episcia* 'Cleopatra' is one popular plant with pink-variegated foliage and *Episcia* 'Silver Skies' is a perfect miniature with silver leaves outlined in dark chocolate brown. Episcias require good humidity and temperatures above 55°. They grow well in low to moderate light and should be slightly moist all the time.

Streptocarpus, which means twisted seed pod, is an increasingly popular plant with a nice growth habit and beautiful flowers. Modern hybrids such as the Concord and Olympus series are bred for their compact size and floriferousness. The flower is a short flared tube in many shades of white, pink and blue, usually with some striping or a yellow blush in the throat. Some hybrids are almost everblooming and others have somewhat cyclical patterns similar to saintpaulias. When growers get bored with all of those flowers, they can go back to the fascinating species which grow on the steep kloofs or mountainsides of eastern Africa. Some are neat little miniatures such as *Streptocarpus cyanandrus* and others have only a single three-foot leaf which may take two years to grow, flower, set seed and die to start the cycle all over again. *Streptocarpus* should be underpotted and well fertilized for better bloom. Place in an east or west window or under lights and provide good air circulation. They are beautiful in window boxes and are being used as bedding plants in shade and partially shaded locations outdoors.

The popularity of gesneriads began with the florist's gloxinia or *Sinningia speciosa.* Its interest has never waned as a commercial pot plant, but the hobbyist has found the large Belgian hybrids to be somewhat demanding in conditions other than in the high light and humidity of a greenhouse. One strain of *S. speciosa* which has been repeatedly successful are the Buell hybrids which are perfect for

Photo by Michael A. Riley

The white, pink or blue flowers of Streptocarpus *are often striped on the lower lobes of the corolla. Pictured is one of the 'Olympus' hybrids.*

windowsill, artificial light culture and the greenhouse. These hybrids are more compact in habit with much larger flowers and a fantasy of colors and patterning. The advent of fluorescent light gardening has called for the miniaturization of everything and sinningias are no exception. *Sinningia pusilla* is of mature flowering size in a one-inch pot.

Many hybridizers, such as Martin Mines and Ted Bona, have developed hundreds of new *Sinningia* hybrids which grow to blooming size in a two-and-a-half-inch pot and in every color imaginable, including yellow. All sinningias develop tubers underground and therefore have a definite cycle of growth and dormancy. Some tubers resprout immediately while others remain dormant for a month or two. When growing, they take the same consistent culture as previously discussed. Higher light intensity during the first two weeks as the sprouts emerge from the tubers produces a nice compact crown of leaves prior to bloom.

Many gesneriads are true epiphytes and naturally grow in trees on steep hillsides where they have limited root systems. They often have either a spreading or trailing habit, relatively small leaves and spectacular flowers. All of these qualities make them perfect candidates for hanging basket culture. Their size can be controlled for culture under lights, but they grow best in a window with higher light intensities. Their habitats in nature are more varied and they can tolerate slightly more erratic watering schedules and temperature fluctuations. Columneas have an enormous range of characteristics and some are true seasonal bloomers while others such as *Columnea* 'Chanticleer' are everblooming. *Nematanthus* have rounded shiny leaves similar to hoya and brightly colored red and orange flowers. Both *Nematanthus* and *Aeschynanthus* prefer higher light intensities and bloom nicely in a south window while columneas, in general, grow best in an east or west exposure. They can be moved outside for the summer as long as they are kept watered.

The diversity within this one plant family is unusual and seemingly infinite. New collections from the Far East and many parts of South America are being introduced. There is *Nautilocalyx* with hairy stems and shiny

Invest in the Best and the Brightest

Hibiscus *hybrids are available in many bright colors. Flowers contrast nicely with dark green glossy foliage.*

Sinningia speciosa *was originally collected by Guest Editor, Charles Marden Fitch, in Brazil.*

Top: Hoya bella *is a vine that bears waxy flowers in umbels. The perfection of the individual flowers gives them the appearance of unreality.*

Bottom: *Carts equipped with fluorescent lights can be placed almost anywhere. This one is in the basement. Here is a varied collection of begonias, African violets, and orchids.*

Top: *Miniature rose 'Little Liza' provides a complement and accent for the tea table.*

Bottom: Kalanchoe *'Cinnabar' is a bright splash of color in any surroundings.*

Aechmea fulgens *var.* discolor albo-marginata *displays colorful fruits for a long time.*

Hoya acuta, *left, is trained on a wire loop.*

A collection of haworthias planted in a low dish is a study in shapes, textures and shades of color.

leaves, *Drymonia* which vines through the trees, *Negria* which are trees on Lord Howe Island and true alpines such as *Jankaea heldreichii* from Mount Olympus. *Bellonia spinosa* has spines, the green and purple spotted flowers of *Capanea grandiflora* are pollinated by bats and the entire genus of *Codonanthe* has a symbiotic relationship with ants. Many other gesneriads are pollinated by hummingbirds and bees. These plants have strikingly colorful flowers and add diversity and interest to an indoor collection.

Saintpaulia *'Pixie Blue' is a miniature with a trailing habit that was bred by Lyndon Lyon. This plant is in a three-inch plastic pot.*

Sinningia *'Bright Eyes' is a miniature plant (see pencil point) which thrives in terrariums and under fluorescent lights.*

Hoya obscura *has unusual flowers.*

Hoya

Christine M. Burton

Hoya is a varied genus. Of the approximate 150 known species, some are succulent but most are not. Some have huge leaves two feet long by four to six inches wide; others have small leaves (a half inch long by an eighth inch wide) while the balance vary in size between those extremes. Some twine and cling to supports by aerial roots, others cascade from tree trunks or baskets. Some flower repeatedly from the same peduncle, others bloom only once from the same peduncle. Some hoyas have few flowers, others many. There are hoyas with large flowers and those with tiny flowers. Flowers come in white, pink, rose, red, purple, brown and yellow. A few have contrasting crowns, a few have contrasting borders on their corollas.

As there is variety among hoyas, there is variety in the selection of media to grow them. There appears to be no "best" potting medium as growers swear by a variety ranging from garden soil to kitty litter. But all growers agree that the chosen growing medium must contain a great deal of drainage material. A mixture of good potting soil with added perlite and fir bark chips for drainage is suitable. One could also use charcoal, shredded tree fern bark, rocks, or shard. Most hoyas grow best at temperatures above 45 °F and flower best when the temperature is above 70 °F . Most grow naturally in tropical rain forests in the hottest parts of the world so they tolerate hot weather well. Some of those from higher elevations flower better between 70 °F and 80 °F but the plants do not seem to be harmed even at 120 °F which my central Georgia greenhouse has been known to register.

Many report that hoyas will bloom only in sunlight sufficient to cause yellowing of the leaves. I have not found this to be true. I have grown and flowered *H. carnosa* in dense shade. Others bloom in my greenhouse with shade cloth screening 73% of direct sunlight. One factor that I have found to inhibit bloom is air conditioning. Why a hoya that will bloom in a greenhouse at 72 °F will not bloom indoors with the thermostat set at 72 °F is a mystery. But I suspect it's the lack of humidity. I recommend moving hoyas during bloom season to a screened porch or tree limb. . . unless your home is not air conditioned or you have a greenhouse.

Almost all hoyas require a lot of water during hot weather but less during cooler weather. A good rule is to water thoroughly when the potting medium is dry one to two inches down from the top of the soil. During growing season, a balanced fertilizer such as 20-20-20 (or one with less nitrogen if yours are already growing too large) at one-quarter teaspoon per gallon of water at each watering or a slow release fertilizer scratched into the soil. During the cooler winter months many hoya growers use an 0-10-10 formula once or twice.

The only serious hoya pests are mealybugs.

Christine M. Burton is a trained musician, whose hobby has always been plants. She is the founder of the Hoya Society and editor of its bulletin, "The Hoyan."

In their native habitats hoyas climb tree trunks. This sturdy hoya is growing along with dendrobium orchids in Southwest Sumatra near Ombilin.

Mites are also said to be a cause of concern but I have never seen mites do permanent damage to hoyas. To a lesser extent scale is a problem. Hoyas are sensitive to some chemical products. The product I have found safest is insecticidal soap. Others recommend rubbing alcohol, onion juice and garlic.

Sadly, few hoyas are available in retail stores. If one wants to grow species, purchase them from mail order sources. Some sources are listed at the close of this article.

Some Recommended Hoyas

Hoya angustifolia is a plant with variable sized fuzzy leaves on thin stalks. In nature it creeps or twines on branches and tree trunks so is adaptable to hanging basket culture. The one-inch clusters of tiny yellowish-pink flowers are borne on long, thin peduncles. It flowers from a few months to a year after planting and after first flowering is quite reliable. Although usually thought of as a miniature in cultivation, in nature it gets quite large.

Hoya australis is available in many forms but most are very slow to bloom and often buds fall without opening. One form exists that has few faults. This one comes from the Solomon Islands. It is often found in commerce under the erroneous labels of *H. bandaensis* and *H. obtusifolia* (both names belong to very different hoyas which are not available). Leaves are round to oblong and bright green with no speckling. Flowers are white, both corolla and corona, with five dots of red showing on the corolla at the base of the crown.

Hoya bella is known as "The Miniature Hoya." The leaves are miniature when compared to those of *H. carnosa* but are far from the smallest hoya leaves. The flowers are medium sized among a genus whose flowers range from a few centimeters in diameter to well over three inches. The plant itself is something else. I have seen three six-inch cuttings grow to fill an 18" pot with branches cascading over five feet in three years. That is not a miniature. The secret of keeping *H. bella* healthy appears to be to break all the rules by keeping its "feet" wet. Never let it dry out. There are at least three forms of this species, including one with variegated leaves. The easiest to grow appears to be the variety *Paxtonii*, (listed by some dealers as sp. #444). It has much larger undulate leaves. Very similar is *H. lanceolata* (also sold by some as *H. sikkimensis)*. By far the most beautiful is *H. bella variegata*.

H. carnosa is usually available as "Grandmother's Old Fashioned Wax Plant." Retailers do not tend to sell it, assuming that everyone who wants one has one. The glossy leaves are elliptic in shape and speckled with silver. The pink velvet flowers appear in large clusters. *H. carnosa* may take five or more more years to initiate bloom. The similar *H. motoskei* has lighter flesh colored flowers and round leaves. It is not quite as handsome as *H. carnosa*, due to duller leaves. However, it blooms at a younger age. I would not recommend these two unless one is a collector. Contrary to past thought, *H. motoskei* is not the same species as *H. carnosa*.

Hoya cinnamomifolia has fairly large dull green leaves with lighter colored veins, arising at the leaf base and running parallel to the midrib. The greenish-yellow flowers with blood red crowns appear in large clusters. It is easy to grow. A similar species, only recently in cultivation, is *H. purpureo-fusca*, which has leaves with the same venation. Flowers of *H. purpureo-fusca* differ from those of *H. cinnamomifolia*—they are pubescent and the corolla is purplish brown with purple crowns.

Hoya incrassata is good for a beginning houseplant enthusiast because it is a fast grower. It makes a handsome basket plant very quickly although the flowers are not as conspicuous as most—yellow with a red or rust margin. The margin is visible for only a short time before the flowers reflex and the edges turn under. While the margins are visible it is very beautiful. It blooms freely and repeatedly on the same peduncles throughout the summer months.

Hoya imperialis is a plant for people who have lots of space. It has large leaves, extremely thick stalks and large flowers. The flower clusters usually measure around nine inches in diameter, with individual flowers up to three inches in diameter. Flowers are brownish red with a cream corona. The variety *rauschii,* which is more common in the U.S., has pink blooms.

A tiny creeping relative of boyas Dischidia nummularia *(see pen point at the right for size reference). This epiphytic vine will thrive planted in rough sphagnum moss or a coarse fir bark mix.*

Hoya carnosa *'Exotica' is a variegated cultivar of the easy to grow fragrant-flowered species.*

H. kerrii is the species called "Valentine" or "Sweetheart," formerly called by some U.S. dealers *H. obovata,* a name belonging to another species. The leaves are dull green, notched at the outer end, and pointed at the base. The overall leaf shape is that of a valentine. There are three forms of *H. kerrii* in U.S. trade. One has glabrous leaves; one has pubescent leaves and the third has more or less parchment-like leaves with a little speckling on the upper surface. The similar *H. obovata* has roundish, unnotched leaves and larger flowers, which have a differently shaped corona. It is a much easier plant to grow but lacks the interesting heart-shaped leaves of *H. kerrii.*

Hoya lacunosa is a true miniature having leaves about an inch long by a half-inch wide. Flowers are white with yellow crowns. They are fuzzy little stars tightly curled appearing to be little balls. They have a very clean, pleasant scent. In nature, *H. lacunosa* climbs along tree trunks, where ants build tunnels and nests among its roots and stems. In cultivation this species adapts to growing in a basket.

Hoya macgillivrayii is probably the most beautiful of hoyas. The large thick leaves grow on thin wiry stems that appear too fragile to hold them. The flowers vary in size from clone to clone, from two-and-one-half to three-and-one-quarter inches in diameter, with five to thirteen flowers in each umbel. Color varies from white to deep maroon, depending on light, nutrition or temperature—no one knows just what causes the varying shades, often on the same plant at the same time. There are at least three forms of this hoya available, plus two forms of a closely related one (which may prove to be a variety of it), *H. archboldiana.* The smaller flowered one is the better bloomer. The scent is divine. The only fault in this species is the extremely wide spaced leaves. This spacing means that the plant must be very mature before the plant matches the flowers in beauty, even though the leaves are among the most beautiful of all hoya leaves.

Hoya obscura is a small to medium-sized plant which grows best in a basket. The rather stiff stalks are not as inclined to twine as most hoyas. The leaves are light green with lighter pinnate veining. The leaves of some clones turn quite red in the winter sun. The small flowers are similar to those of *H. lacunosa.* A pink flowered form and a white flowered form are known. *H. obscura* is relatively new to the trade so the price will be rather high. I list it here because so many Hoya Society members have stated it is their favorite. It is very easy to grow and with such popularity should become reasonably priced very soon.

Hoya 'Pink Silver' is a beautiful and easily grown clone of an unknown species. It is almost universally mislabeled *H. purpureo-fusca* by dealers and writers alike. *H. purpureo-fusca* is a different species, currently listed by only one U.S. grower at a ridiculously high price, which will be much lower as more stock is available. 'Pink Silver' is also available as *USDA #353450,* 'Silver Leaf.' The leaves resemble those of *H. carnosa* but often have more silver speckling. Flowers differ principally in being deep maroon with a white crown. The crown is larger and somewhat different in shape. *H.* 'Pink Silver' blooms at a younger age than *H. carnosa* and is much showier. A form from

the Philippines has deep red stems and veins (on the underside) and much more silver flecking. The flowers are almost black and the crown even darker. A similar cultivar, 'Red Button,' is popular but not nearly as handsome.

Sold as *H. pubera* or sp. *geri* is a tiny little woody-stemmed hoya with tiny umbels of pinkish flowers. It blooms in the fall with umbels at every node (when young) and over a long period. It is just about everyone's favorite, as it is a miniature well-suited to the light garden.

Hoya shepherdii is the "String Bean Hoya," which, even now is being sold by some as *H. longifolia* (while *H. longifolia* is being sold as something else). *Hoya shepherdii* is easy to grow, blooms when young and can be counted on to bloom each spring. It is interesting for its long skinny leaves, a contrast to the usual ovate or elliptic shaped leaves. *H. shepherdii* is very common, so the price is usually very reasonable.

Hoya serpens is easy to grow but difficult to flower, but all who see a photograph of it want it. The leaves are about the size and shape of a dime, dark green and sparsely hairy. The flowers, which are larger than the leaves, open green, become white and turn pink as they mature. Often all three colors can be seen on a mature plant at the same time. In the past this was erroneously listed as *H. engleriana, H. minima, H. nummularia* (all three different species) and *H. miniata.* This hoya is not recommended for the beginner—excellent in a light garden as it is a true miniature.

Hoyas easy to find in shops, grocers and discount stores are cultivars known as "Indian Ropes," plain and variegated, 'Krimson Queen,' 'Krimson Princess,' and others. These plants are best sought locally. The easiest and most rewarding Indian Rope is one called 'Krinkle 8.' The leaves and stalks, which cascade, are extremely thick. The plant, a vigorous grower, flowers soon and often. Despite the thickness of the stalk, the cascading habit makes for a very graceful appearance in a hanging basket or in a pot on a pedestal. A variegated form of 'Krinkle 8' is available but is not a vigorous grower.

A closely related genus, *Centrostemma,* has several species worth growing along with hoyas. *Centrostemma multiflora* is available from most hoya dealers, often under the label *Hoya multiflora.*

There are many more hoyas available and more being introduced each season. If you are undecided, most growers will help you select a few to start you off. Also the Hoya Society International sponsors a number of round robins. These help the beginner to learn what others grow and how they grow them. Members often trade plants and cuttings along with knowledge. Recommended dealers:

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ad Astra Flora, Route 1, Box 333-A-2, Monticello, GA 31064

Hill 'n Dale, 6427 N. Fruit Avenue, Fresno, CA 93711

Rainforest, 1550 Rycroft Street, Honolulu, HI 96814

Ralph Reardon, 110 Demandre Street, Belle Chasse, LA 70037

For information about The Hoya Society International write to: Christine M. Burton, P.O. Box 54171, Atlanta, GA 30308.

Hoya 'Hindu Rope' has twisted waxy succulent foliage with varied patterns of cream and green often flushed with pink when grown in bright light.

Araucaria heterophylla, *Norfolk Island Pine, is contrasted here with* Dracaena deremensis.

Rheo spathacea, *Moses-in-the-boat, grows on rotting leaves which gather among the coral stones in Mexico.*

Foliage Favorites for Indoor Gardens

A photo essay by Charles Marden Fitch

Foliage plants are the most adaptable of indoor plants because they need less light than the specimens we grow for flowers. Perhaps the most common foliage plant in offices is the heart-leaf *Philodendron oxycardium,* a species from the jungles of Central America. This philodendron, like its common companions the Chinese Evergreen (*Aglaonema*) is an aroid, a group of lovely plants so suited to indoor gardening that this book gives them a separate family feature. In addition to the many aroids appreciated for their foliage are species from several genera, all worth considering as indoor decoration. These photographs illustrate some of the choices you will find at well stocked nurseries and mail order gardening firms.

Foliage plants thrive in a bright window in Spain. Shown are Asparagus densiflorus, *spider plant and variegated ivy.*

Hedera helix *'Itsy-Bitsy' is a miniature ivy. This one is growing in a hanging container.*

Hedera helix *var.* conglomerata *has an upright rather than weeping habit. Planted in a glazed bonsai tray with weathered driftwood and mulched with sphagnum moss, this combination makes a striking centerpiece.*

Helxine soleirolii aurea *has light golden yellow foliage which makes it an attractive ground cover in terrariums or around the base of potted plants.*

Left: Ficus diversifolia *is called mistletoe fig because of the yellow fruits borne on mature specimens.*
Above: *Unusual foliage of some tropical plants: Top left:* Ficus pumila minima *and* F.p. *var.* quercifolia *(oakleaf); bottom left:* Anthurium polyschistum; *Top right: trailing* Gibasis geniculata *(which will have tiny white flowers).*

Scented Geraniums

Scented-leaf geraniums (Pelargonium). *This photogram shows the leaves of several scented geraniums at actual size. Included are* P. filicifolium *'Fern Leaf' (bottom right),* P. *'Joy Lucille Variegated' (top left),* P. denticulatum *'Pine' (bottom left),* P. graveolens *'Rober's Lemon Rose' (top right), and* P. *x 'Blandfordianum,' a hybrid of* P. graveolens *and* P. echinatum *(right center).*

Joy Logee Martin

Interest in scented geraniums has waxed and waned through the years. These plants are native to South Africa and were first introduced into England in 1632. By the end of the 17th century many varieties had been collected. The most useful and popular are the rose scented kinds, *P. capitatum* and *P. graveolens* and their hybrids. Acres of rose scented geraniums were grown in France and Turkey to produce the less expensive rose oil or attar of roses to replace the true oil of roses. It is the fragrance released by the oil glands on the leaves when they are slightly bruised that gives the scented geraniums their charm.

In addition to the rose varieties there are many other scents and flavors; lemon, lime, nutmeg, orange, pineapple, strawberry, coconut, peppermint, pine, etc. Pelargoniums are often classified in catagories such as rose, lemon, fruit scented, mint scented, spice scented. Today some collectors list over 100 varieties. Many are very much alike in form and fragrance, but to the eager collector they all have a place.

A scented geranium revival began in this country in the 1930's when one collector assembled and identified over eighty varieties. Not only is it fun to grow species such as *P. odoratissimum* (apple scented) and *P. parviflorum* from seed, but a sharp eye will often observe different growth, which is how many variegated forms have been discovered, including the lovely *P.* x *fragrans* (nutmeg).

Scented geraniums are easy to grow. Sun loving, they will grow in relatively cool locations as indoor plants. When planted in the garden varieties such as peppermint, *P. tomentosum* will grow to enormous size in one season. The soil should be well-drained, a mixture of equal parts of soil, sand and compost with the addition of a two-and-one-half-inch pot each of lime and bone meal per bushel of soil mix. Take cuttings at any time from tip growth; select half-hardened stems about two-and-one-half inches to three inches long. Dip in rooting powder and place in sand—they will root in about ten days. Or cuttings can be placed in a medium of sand, perlite and peat moss. Temperature for rooting should be 60° to 70° degrees.

Scented geraniums have relatively small flowers of lavender to white. A few exceptions are 'Clorinda' with large rose colored blooms, 'Mrs. Taylor' with smaller umbels of scarlet flowers, 'Pretty Polly' with light pink blooms and 'Apricot' with salmon flowers.

Scented geraniums make excellent standards. If large standards are desired, 'Rose,' 'Clorinda,' 'Pretty Polly,' 'Mrs. Taylor,' and 'Mabel Grey' can be used. For short dwarf standards, 'Little Gem,' 'Lime,' 'Ginger,' 'Lemon Crispum,' 'Prince Rupert Variegated,' and 'Spring Park' are excellent candidates. Choose a plant with a central straight stem and stake it. When the plant has reached a height of about 10 or 12 inches remove the lower leaves and side shoots, leaving about four breaks from the top. When the plant has reached the preferred heights pinch out the center. As it grows pinch out the tip ends to make a round bushy top growth. The plant must be pruned judiciously every three months.

Following is a list of the most fragrant and best growers:

P. graveolens—rose scented

P. graveolens 'Variegatum'—rose scented with pink, white and green leaves

P. crispum 'Lemon Crispum'—the finger-bowl geranium

P. crispum 'Prince Rupert'—a fine variegated lemon scented

P. 'Mabel Grey'—lemon verbena fragrance, holds its scent when dried

P. odoratissimum—apple scented

P. x *limoneum*—cinnamon scented

P. x 'Torento'—ginger scented

P. fragrans 'Logeei'—spice scented

P. nervosum—lime scented

P. x *fragrans* 'Variegatum'—nutmeg scented

P. citriodorum—orange scented

P. 'Spring Park'—lemon-strawberry scented

P. tomentosum—peppermint scented

P. x 'Clorinda'—pungent, eucalyptus scent

P. quercifolium 'Fair Ellen'—oak leaf, pungent scent

Joy Logee Martin is director of Logee's Greenhouses in Danielson, CT, and writes, lectures, and teaches about horticulture, especially herbs and begonias. Her collection includes more than 75 varieties of scented geraniums. Mrs. Martin is well known for her articles in popular gardening magazines, and as a flower show judge.

Why not enjoy
America's number one flower
through the seasons . . .

Miniature Roses Under Fluorescent Lights

Charles Marden Fitch

You can have fragrant roses all year round by growing miniatures under fluorescent lights. For gardeners in cold temperature climates it is especially thrilling to pick roses during the winter. Rose experts also like to grow miniatures under lights so they can have top quality blooms for rose shows. I like growing miniatures under lights because the tiny flowers are so abundant, colorful, often fragrant, and last many days when cut in bud. Best of all, the miniature rose bushes are cold hardy so after enjoying them under lights a season or two, one can plant them in the garden for years of outdoor pleasure. This makes space for new kinds the next winter.

Light and Temperature*

Like the larger roses, miniatures must have intense light to produce the best blooms. With low light they will grow but flowers will be few, colors abnormal, stems weak. My best indoor miniature roses are grown under four 40-watt broad spectrum fluorescent lamps. The bushes under broad spectrum tubes have more flowers, better color and sturdier stems than the same varieties grown under plain household lamps such as cool white or warm white.

Miniature roses produce buds on new growth, so keeping them growing is important. I provide 14 to 16 hours of light per 24-hour period. Seedlings will bloom faster if given up to 18 hours of light. Keep foliage close to the lamps but watch that buds do not touch the tubes. Although tubes are cool compared to incandescent bulbs, they will still burn leaves or buds that push against them.

**Also consult information in the feature "House Plants Under Lights" on page 82 of this issue.*

My miniatures thrive under intermediate conditions, with night hours 58 to 62 °F, daytime highs up to 78 °F. If grown cooler, they slow down and flowers last longer; if grown warmer, they tend to have lighter-colored flowers which last fewer days. Since these are cold-hardy plants they can accept very chilly temperatures, but the object of having them indoors is to get flowers on new growth. Therefore nights of 60 to 65 °F, combined with bright 14 to 16 hour days, are the most practical. Keep relative humidity between 50 and 60 percent. Low humidity encourages red spider mites and smaller flowers; too high a humidity, especially with still air, encourages fungus.

Potting

The smallest miniature roses thrive in three to four inch pots. Taller ones grow well in six to ten inch containers. Slightly restrict root room if you wish to keep bushes compact. Plastic pots are excellent, but clay are also suitable if you avoid letting the bushes dry out completely at the roots. Place a half to one inch of gravel in the bottom of the pot, then add a chunk or two of hardwood charcoal, followed by coarse unmilled sphagnum moss, then the potting mixture.

I find commercially prepared potting mixes suitable when the package directions are followed. Some types contain fertilizers,

Miniature rose 'Green Ice' makes a bushy semi-trailing plant which is suitable for hanging baskets. Start the plants under lights and when buds appear, hang in a sunny window or sunporch.

A miniature rose blossom, held between two fingers demonstrates the size of the flower.

These miniature roses thrive under broad spectrum fluorescent lamps where 12 to 16 hours of fluorescent light supplements morning's natural light. Shown left to right are: 'Claret,' 'Linda,' 'Mimi,' 'Green Ice,' 'Littlest Angel,' 'Pearl Dawn,' 'Seabreeze.' The pots sit on moist gravel for added humidity. Two Cryptanthus *plants provide contrast.*

Plant miniature rose seed in flats filled with milled sphagnum moss mixed with perlite and vermiculite. Dust seeds with Rootone to stimulate roots and prevent fungus problems. Space seeds one to two inches apart so seedlings have room to grow before transplanting.

Perfection is possible even though the size is diminutive—see ring for scale.

others grow nice plants only when fertilizer is provided in solution every few days. The mix should be slightly acid and retain moisture without getting soggy. Miniature roses should never dry out completely at the roots.

Ordering, Selections

Mail-order miniature rose specialists will send you sturdy bushes anytime. For indoor growing start with dormant bushes as sent by many nurseries, or pot active bushes, but let them stay outdoors in the fall to early winter until they experience six to eight weeks of cold weather. As cold-hardy plants, miniature roses should have a dormant period each year to make the best growth and keep a compact shape.

Most suitable for growing under lights are micro miniature hybrids and selections that can be pruned to stay under eight inches tall. With the recent great interest in miniature roses many hybrids have been developed, and each year a batch of new ones is introduced. Some of my favorite proven selections are: 'Cinderella', a compact, very double white blushed pink; 'Littlest Angel', a micro mini with wider than high habit, perfectly formed golden yellow half-inch flowers on a three to four inches tall plant; 'Magic Carrousel', a sturdy fragrant white with red edges, excellent form, long lasting; 'Party Girl', a fragrant apricot yellow of exhibition form, adaptable habit; 'Pacesetter', a perfect miniature of classic hybrid tea type, white sometimes blushed pink, fragrant; 'Rise 'n' Shine', the best yellow mini for fragrance, form, color; and 'Zinger', with brilliant crimson red flowers which show a contrasting yellow center when mature.

Culture

Miniature roses will produce the first flowers six to eight weeks after starting growth after a dormant period. Once active they continue to produce flowers for many months. Provide a balanced fertilizer in solution every other watering or apply timed release fertilizers designed for roses. Active roses need a steady supply of nutrients and water. You can prune back bushes to keep them compact but always leave at least one third of the growth.

Miniature roses indoors are less likely to get foliage fungus if you keep air circulation constant. I use a fan going all the time in my basement light garden area and also in the greenhouse. Wash bushes with room-temperature water every month to discourage red spider mites. Miniatures can be treated with the same fungicides and pesticides used on outdoor roses.

Learning More:

For more details on these tiny plants please see *The Complete Book of Miniature Roses* by Charles Marden Fitch (Hawthorn/Dutton pub.)

Tropical Bulbs For The Home

Don Richardson

The great beauty of tropical bulbs can and should be appreciated in the home. Yet many are purchased, then lost, because their cultural requirements are not well understood. Several factors should be considered when selecting tropical bulbs: size of the mature plant; flowering season; temperature and light requirements.

These factors are important for various reasons. As an example, let us consider the lovely *Agapanthus.* Though not a true bulb, it is often sold in stores with amaryllis *(Hippeastrum)* and other bulbs. The normal flowering season of *Agapanthus* is July and August, hardly a time when most people need or want a three-to-four-foot plant to bloom in the home. Granted, there are several dwarf types, but they would be better used in tubs on the terrace at that season. A better choice would be the amaryllis *(Hippeastrum)* itself, which can be flowered from December to April, a time when indoor growers are more likely to appreciate it.

Bulbous plants usually need a dry resting period which corresponds to the dry season in their native habitat. The majority of flowering bulbs need good light and a well drained, friable potting soil plus some bone meal. Supplemental fluorescent light can easily be provided in the home if light intensity is too low. Bulbs preferring cooler temperatures, such as lachenalias, may be grown in a cool room or on a porch where temperatures will remain above freezing.

Amaryllis

Perhaps the best known, and certainly among the most colorful tropical bulbs are the modern amaryllis *(Hippeastrum)* hybrids with large, broad, open flowers that can measure eight or nine inches across. The bulbs, which are of good size, have two stout flower stalks. Red, scarlet, pink, salmon and orange are some of the colors found in these hybrids, and plants with striped flowers are not uncommon.

Enterprising dealers often sell amaryllis bulbs already potted. If you buy bare bulbs, which are available from November through March, pot them up in a good soil mix, covering about half the bulb with soil and leaving the top part exposed. Slightly tight potting, as in six-inch pots, is best.

Place the potted amaryllis bulbs where they will receive gentle heat from below, and do not water for about two weeks. The flower spike will usually appear first, then the leaves. Give plants more water after leaves start growing. It may be necessary to support the spike, since bulbs often flower before making roots.

Amaryllis bulbs are expensive, so good after-care is advisable. Cut off the flower spike when blooms fade. Keep foliage growing all summer, with plenty of water and food to build up strength for the following year's flowers. The pots can be plunged in the

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Top: *Dramatic flowers of Dutch type hybrid amaryllis.*

Bottom Left: Eucharis grandiflora *has foliage that resembles an* Aspidistra. *Fragrant white flowers are produced two or three times a year if the bulbs are given dry rests between growth periods.*

Bottom Right: Cyclamen persicum *hybrids have flowers in shades of red, purple, pink and white. The mottled foliage is attractive as well.*

Don Richardson was a professional horticulturist at Greentree Estates in Manhasset, N.Y. He was known for his knowledgeable approach to growing orchids and other tropical exotics.

Clivia miniata *is an amaryllis relative. The leaves are wide and leathery and the roots thick and tuberous. The fragrant flowers are orange with creamy yellow centers appearing in the spring. Clivias come from South Africa.*

ground outside for the summer. If you keep them inside, give them good light and water until October, when they can be rested.

In December or January, top dress the pots, scratching away some of the surface soil and replacing old potting mix with some good soil enriched with bone meal. Any small side bulbs can be removed and grown on, or they can be left to form a specimen plant which will have several spikes. The flowers may not be as large as with commercially produced bulbs, but a pot with more flowers is very pleasing, even when individual flowers are smaller. These showy hybrid amaryllis, developed from several South American species, may be listed under confusing names, so selecting them by color is a practical way to order.

Clivia and Lachenalia

The Kaffir-lily or *Clivia* (formerly *Imantophyllum*) is in the same botanical family as the amaryllis. Clivias are from South Africa and are probably better all-round houseplants than amaryllis because they have good foliage through the year. However, we cannot expect the same wide range of color as that obtained from amaryllis. Clivias have fleshy roots, not true bulbs, so pot single crowns in six-inch pots and larger specimens of several crowns in ten- or twelve-inch pots or tubs. There should be no drastic dry rest, just a moderately dry period in December and January. Clivias are rich feeders so give liquid fertilizers freely during the growing season.

Plants available are usually hybrids of *Clivia miniata* and *C.* x *cyrtanthiflora*. They bloom in winter, bearing clusters of lilylike flowers in shades of orange, red or pink on eighteen-inch stems. Blooms last for two weeks when cut. Clivias resent disturbance, so grow them for several years in the same container before repotting. Division of the plants can be done after flowering. Clivias are able to grow in low light but need good strong light for an abundance of flowers.

The Cape-cowslips *(Lachenalia),* also from South Africa, belong to the Lily Family. They must have a complete dry rest after growth is complete. They prefer cooler temperatures, needing only enough warmth to keep out the frost. A 50 °F night temperature is ideal. The bulbs are small, so a half dozen can be planted in a six-inch pot, with the tips of the bulbs just at the surface. They like good light and if kept cool, can be enjoyed for two months. Strong bulbs will produce three or four spikes of tubular, bell-shaped flowers. Those usually offered are cultivars of *Lachenalia aloides;* 'Aurea' is bright orange-yellow; 'Nelsonii' is bright yellow; 'Quadricolor' is red at the base, greenish-yellow in the middle, and green at the outer edges.

Lachenalias make attractive hanging baskets. If you wish to grow them this way, prepare a wire basket with moss lining. Plant some of the bulbs upside down at the base, about three inches apart, plant others on their sides at the sides of the basket, then plant still others upright at the top, filling in the potting mix as you go. Any *Lachenalia* can be used, but perhaps the best for this purpose would be *L. bulbiferum* which is red-purple and yellow in color. After flowering, watering should continue until the leaves start to yellow. Then dry the plants off until the end of August when the bulbs can be repotted. Small bulbils can be grown on to flower in two years.

Eucharis, Veltheimia, Others

Eucharis, the Amazon-lily, is another bulb related to amaryllis. Flowers are white, large and showy, but the plants are also of substantial size. Native of Colombia, they require temperatures of 65-75 °F and higher in sum-

mer. *Eucharis grandiflora,* sometimes listed as *E. amazonica,* is the species usually offered. The stalked, oblong leaves are dark green, bold and attractive. Plants should never be allowed to dry out completely. A short period of drier treatment in autumn is often advocated, but ours are watered and fed the year round and produce two crops of flowers a year. They are four inches across and are borne on scapes about two feet high. Plants in twelve-to-fourteen-inch tubs are very handsome, and the flowers last well when cut.

Veltheimia is a small genus of South African bulbs belonging to the Lily Family. The bulbs are fairly large, and just one in a six-inch pot makes quite a show, although I prefer larger pots with several bulbs. The flowers are borne in dense clusters on a stout spike or raceme. They are pendant and tubular, and in *V. viridifolia* they are reddish with greenish tips. There may be up to thirty flowers a spike, each flower one and one-half inches long. Veltheimias should be dried off when the twelve-inch-long straplike foliage turns yellow. Allow about two months dry rest. Plants prefer cool conditions.

Scilla peruviana, unlike our garden scillas, is not winter hardy in the cooler parts of the United States. Despite its botanical name as well as various misleading common names (Cuban-lily, Peruvian hyacinth), it is from the Mediterranean region. We grow this scilla under the same conditions as *Veltheimia.* The deep green leaves are nine-to-twelve inches long and radiate from the bulb. There are 50 to 100 blue-violet flowers in a dense raceme on a short scape, with the lower flowers opening first. To me, the inflorescence in bud is perfectly beautiful. There is also a white form, *S. peruviana* 'Alba', but the flower heads are usually smaller. Scillas are in the Lily Family.

Cyrtanthus is a genus of plants in the Amaryllis Family. From South and East Africa come up to 40 species, but few are seen in cultivation. Undoubtedly the best for home-growing are the *Cyrtanthus mackenii* hybrids. The bulbs are small so plant five or six in a five-inch pot. Because *C. mackenii* is a swamp plant, hence unaccustomed to a dry period, its progeny can be kept growing most of the year in the home. The narrow leaves are small, and there are five to ten tubular, fragrant flowers, each about two inches long. It is best to repot the bulbs every year since they make many bulbils. Grow them cool.

Vallota speciosa (purpurea), sometimes called Scarborough-lily, comes from South Africa. It is related to *Cyrtanthus* and has been hybridized with it. The plant and flowers are more like amaryllis *(Hippeastrum),* although *Vallota* usually flowers in August. Once potted it is advisable to let the bulbs become crowded in the container.

Repotting of *Vallota* is best done in June, at which time the crowded bulbs can be transferred to a larger container. Give plants a rest in winter, but do not let them become completely dry. Water them freely and feed them well with liquid fertilizer when they are growing. The flowers are bright scarlet, three-to-four inches long, several to a scape.

Cyrtanthus mackenii *hybrid. Flowers of coral peach are borne on slender stems arising from a small bulb.*

HOUSEPLANTS IN APARTMENTS

Elvin McDonald

Apartment gardeners, as compared to those who live in houses, typically have less control over light and temperatures, less space for plants and supplies, and usually no place to grow except indoors. Despite these seeming limitations, it is possible to obtain great satisfaction in all seasons from a vast array of plants cultivated for flowers, foliage and fragrance.

Let's imagine you're in New York and have come to visit my garden, which happens to be entirely indoors in a modern high-rise building. The street below is busy, noisy and polluted, yet as soon as you enter my door, all that seems far away. Throughout the apartment, dozens if not hundreds of plants grow in every room, all in clay pots with matching saucers. Moisture evaporating through the unglazed walls helps maintain humidity at a desirable 35 percent or more even during the winter heating season. Moist earth and clay also smell good.

Our tour begins in the entry area, which accommodates a round dining table. The cloth is floor-length for good reason: concealed underneath in autumn are 30 pots of resting amaryllis that spend spring and summer in windows soaking up the sun's energy and, come winter, give it back in a spectacular flower show.

Next to the table is an old marble-top dresser. Here I display seasonal harvest from my weekend garden in the country. In autumn there'll be a big pumpkin, some winter squash and a basket of Indian corn. A bouquet of fragrant bittersweet berries may remain until spring. At Christmas this space is occupied by living wreaths of hoya and ivy tied with red plaid bows and a bowl of spicy pomander balls.

Bookshelf light garden: two 20-watt tubes light tiny trees—Serissa, Carissa, Leptospermum—*and a "lawn" of clipped baby's-tears* (Soleirolia), *all in Chinese and Japanese pots.*

Nearby in floor-to-ceiling bookshelves that divide the dining and living areas, one shelf 12 by 30 inches is lighted by two 20-watt fluorescent lights that burn 16 hours out of every 24. Here I show off my prettiest miniature plants at any given time: ***Begonia prismatocarpa, Gesneria cuneifolia,*** teacup ***Sinningia*** species and hybrids, myrtle trees nine inches tall, insectivorous sundew and venus' flytrap, backed by small-leaved ivies espaliered on eight-inch circles of wire. If

Elvin McDonald, gardener/writer, is Director of Special Projects at BBG. His twice-weekly column, "Plants in the Home," is syndicated by King Features.

Corn plants (Dracaena massangeana) *trained to tree-form standards, frame view from bed-sitting room to living room. Screwpine* (Pandanus) *on pedestal behind piano gives tree impression.*

there aren't any flowers, I may add cut blooms, maybe wax begonias from window plants, freesias from the florist, or short sprays of red crab apples.

As we enter the living room, notice there are seasonal flowering plants sitting in baskets on the floor. In autumn, chrysanthemums and Jerusalem cherries; at Christmas poinsettias and narcissus; toward spring, cyclamen, azalea, cineraria and calceolaria. Under the table lamps are low-light vines such as silver pothos, trained into tidy mounds.

Columneas tend to be too trailing in habit to accommodate under lights. However, training on an eight-inch circle of wire solves the problem and seems to encourage bloom.

The windows all along one wall face south but receive direct sun only about half the time, owing to a tall building across the street. A giant bird of paradise (*Strelitzia nicolai*) reaches nearly wall to wall, floor to ceiling but no, it doesn't bloom—not enough sun, heat and humidity. Foliage plants surround the furniture, some sitting on the floor in pebble humidity trays, others boosted on pedestals or cascading from hanging baskets. These include ferns, philodendrons, screw-pine *(Pandanus)*, Norfolk Island pine and evergreen amaryllids—*Clivia*, *Eucharis* and *Vallota*—that flower in season.

A row of tall sansevierias thrives in low light and divides the living room proper from a bed sitting room, entered through an archway formed by two eight-foot pleomeles. Dracaenas—*fragrans,* 'Janet Craig,' *massangeana, deremensis* 'Warneckii'—literally cover the walls of these rooms. Bromeliads grow from bark mounts and wall pots hang from structural pillars that extend at right angles into the brightest window light.

Now we head toward the bedrooms, via a hallway that was originally dark and useless. By adding fluorescent-lighted shelves floor to ceiling at either end, I gained 24 square feet of growing space and one of the most appealing areas of the apartment. It is these gardens that offer me a place to potter and putter in the middle of the night. Temperatures on the bottom shelves are often 10 degrees cooler than the top ones—and allow me to succeed with a refreshing variety of plants in only a few square feet of floor space.

In the first and smaller of the two bedrooms I have low-light foliage plants closest to the door, farthest from the windows: *Aspidistra, Dracaena,* miniature *Spathiphyllum clevelandii,* which is rarely without its white peace-lily spathes, beautiful-leaved calatheas and a big basket of *Amomum cardamom,* whose leaves give off a wonderful aroma when stroked.

In the sunny windows I have orchids (*Cattleya, Laelia,* equitant *Oncidium, Dendrobium, Brassavola*), Chinese hibiscus, big snowflake trevesias, which belong to the aralia family, a braided-trunk coffee tree grown from seeds, a *Schefflera arboricola* trained into a tree, and a weeping *Ficus benjamina* that spreads its branches protectively over the bed. Rabbit's-foot ferns and trailing African violets grow in wall pots, again attached to structural pillars at right angles to the windows.

The other bedroom measures about 15 by 18 feet and also has windows across one wall.

Two 30-watt fluorescent tubes over each shelf give 12 square feet of ideal growing space in what was previously a dark, useless interior hallway. Plants on top shelf can be 10 degrees warmer than those on the bottom.

It took me several years to fully understand how I could use this space to best advantage for gardening. Because the apartment is surrounded by other heated spaces, I rarely use the heating unit which is located directly under the windows. I also prefer to keep a window open slightly at night. The result is that plants growing next to the glass experience a cool environment in winter—mid 50's at night, up to 70 °F on a sunny day. This suits geraniums (the Deacon hybrids are recommended for winter bloom; I also have many different scented types), rosemary, bay and parsley. The cool nights bring flowers on holiday cactus (even without long nights and short days) and keep sweet-olive scenting the air September to May.

Plants a few feet back from the windows are slightly warmer and include a variety of begonias, tropical lindens, *Crinum* or milk-and-wine lily, 'Maid of Orleans' jasmine, a bonsai *Schefflera arboricola* and flowering maple. A walk-in closet in the interior is outfitted with a three-shelf fluorescent-light garden measuring two by four feet and provides a perfect place for tropicals—mottle-leaf *Paphiopedilum* and *Phalaenopsis* orchids, African violets, episcias, everblooming *Evolvulus glomeratus* (a bushy morning-glory relative having one-inch heavenly blue flowers), and a collection of small-leaved culinary basils. In late winter and spring this closet light garden serves as a factory for sprouting seeds and rooting cuttings destined for my garden in the country.

The kitchen, at the opposite end of the apartment, is my potting shed. Soil mixes are kept in plastic dishpans on top of the cabinets. Empty pots are stored clean on open shelving, along with vases and baskets. I believe a wellness approach to health is best for plants, as for people. Stay in touch, keep the leaves squeaky clean with mild soap and water and few bugs will bother. For the occasional and inevitable infestations of brown scale, mealybugs, white fly and spider-mite I use nothing stronger than sprays of rubbing alcohol or an insecticidal soap such as Safer's.

Success with an apartment garden depends on the same practices as in a house or outdoors. Plan ahead for when you want color. Determine a planting schedule. I make notes in my datebook and try to keep planting

Ontdoor garden art forms such as topiary and espalier can be practiced indoors, nsing homemade or purchased wire or wood forms.

appointments the same as I do social and business commitments.

Take advantage of microclimates that exist in every growing area—find the cold and hot spots. If too much or too little heat is a problem, a small circulating fan may be the answer. I use both a fan and a cool-vapor humidifier in my closet light garden.

Too much light is rare but if there isn't enough, add some fluorescents, perhaps in a utilitarian space. You'll get the benefits of having a place where plants can be grown well, and can then bring them on occasion to enjoy and share where you and your family live and entertain. If available space for lights is chilly, enclose this garden in plastic; heat from the fixtures makes quite a difference and evaporating moisture boosts humidity to nurture growth.

Fragrance is important to me, and not just because I live in an asphalt jungle. Sweet-olive (*Osmanthus fragrans*), 'Maid of Orleans' jasmine, and citrus gardenia (*Mitriostigma axillare*) are rarely without flowers. From Thanksgiving to Valentine's Day I force pots of tender narcissus (paper-whites, 'Soleil d'Or' and Chinese sacred lily), Dutch hyacinths and lily-of-the-valley. There are also bowls and shallow baskets of potpourri dispersed about the apartment, annually replenished with sweet petals and pungent leaves picked from my country garden.

Another premise I work from is that an apartment garden needs a basic framework provided by evergreen foliage plants. Into this can be set seasonal flowering plants, bouquets of cut or dried flowers and stylish or whimsical topiaries. In spring and summer when I am preoccupied with my country garden, the basic foliage of my apartment garden needs little care.

One needn't have both an indoor and an outdoor garden, but it definitely helps—both gardens and the gardener. The stakes I use indoors, to hold top-heavy amaryllis flowers as well as frames for espaliers and vines, are frugally pruned from shrubbery borders outdoors. A dollar saved on supplies is a dollar to spend on plant materials. Every pot indoors is mulched so that no bare soil shows, also to save moisture and give off earthy smells: pine needles, sheet moss collected from the woods, pebbles from a creek bed.

Indoor gardens, like those outdoors, always need something done, but inside there is a distinct advantage: most of the work, which I know is among the most effective therapies in the world, can be done night or day, wet or dry weather. Training coleus trees, ivy wreaths and creeping ficus topiaries has helped me stop smoking. Planting tiny begonia seeds and finding green babies can bring light into the darkest night. Reach for a plant instead of a pill, a drink or a cigarette, and I promise, you will not be disappointed.

Giant bird of paradise dominates sunny window in living room, with lemon geranium espalier, rosemary wreath, Deacon geraniums for winter bloom and peace lily for flowers all year.

Growing Houseplants From Seed

Steven A. Frowine

Growing plants from seed to maturity is the ultimate achievement for any gardener. Although most gardeners buy their houseplants as mature or small plants, some houseplants, especially some of the bright-blooming pot plants, are very easily grown from seed. Later in this article I will give you specific cultural pointers for some of these plants, but first let's discuss general seed sowing principles.

The Basics

Be sure to obtain fresh seed. The seed packets will have stamped on the back the year of intended use. Older seed will have a lower germination rate. If you obtain seeds from friends, be sure they have been harvested and stored properly. If seeds are not mature, or if they have been incorrectly stored, germination will be poor to nonexistent.

Look on the seed packet or refer to a gardening book to determine how long it takes for the particular plant you are growing to mature from seed to flower. This will give you some idea of the best time for sowing. This information is extremely helpful if you would like to grow gloxinias, calceolarias or other pot plants for gift giving at Christmas or Mother's Day.

By altering the temperature and light intensity, it is possible to somewhat regulate the speed of the growth of these pot plants. If the plants are growing too slowly, increase the amount of light by putting them in a brighter window or extending the number of hours you burn the fluorescent tubes and increase the temperatue by 5 to 10 °F; to slow down growth, reduce the temperature by 5 to 10 °F.

Houseplant seeds are valuable and, many times, very small. To protect your investment, it's usually best to use a commercial seed starting formula available through mail order suppliers or at any garden center. These potting materials are lightweight, easy to handle and to obtain and are sterile so you will not be bothered with weed seeds, or insect and disease problems. If you don't have access to one of these soilless mixes, you can make your own by blending together two parts of sphagnum peat moss, one part perlite and one part vermiculite. This mix, as well as the commercial ones, can be used to start virtually all houseplants from African violets to succulents, including cacti.

Seedlings Require Tender Loving Care

For best germination, seeds require high soil moisture and humidity and warm soil temperatures; most seeds will germinate around 70 °F. If the soil temperature is below 70 °F, especially if the plants are tropical, you will notice a much reduced germination rate and it will take longer for the seeds to sprout. Low soil temperatures can be caused by moisture evaporating from the seed containers (if they are not covered with plastic or glass), by watering the seedling tray with cold tap water, or by locating the seedling container close to a draft. There are simple steps you can take to ensure high soil temperatures: use a heating cable or propagation mat with a thermostat; place the seed container on top

Steven A. Frowine is Staff Horticulturist and Manager of Public Relations at the W. Atlee Burpee Company. He is an avid indoor and outdoor gardener who has a special love for orchids. Mr. Frowine has gardened in Hawaii, Ohio, Missouri, and Pennsylvania.

Photo by W. Atlee Burpee Co.

Exacum affine *'Tiddly Winks' grows easily from seed and provides a bright splash of color.*

)f fluorescent light fixture (the ballast gives)ff heat) or on top of a refrigerator where the ondenser provides bottom heat.

Providing adequate light for seedlings is ritical; once they are spindly from lack of ight, they never seem to recover. A bright vindow or greenhouse will sometimes sup-)ly enough light, but fluorescent lights are nore dependable. They are an ideal light source for germinating and growing seedlings because their light intensity is strong without the accompanying heat found with direct sunlight. Also, with fluorescent lights you can control the amount of light by moving the plants closer or further away from the tubes, or by increasing or decreasing the number of hours per day the tubes burn.

Most seedlings will germinate and grow

Photo by W. Atlee Burpee Co.

Herbs have always been popular as winter houseplants. Pictured here is sweet basil, left and 'Green Bouquet.'

under a two-tube or four-tube fluorescent fixture. Use cool-white or a 50/50 blend of cool-white and warm-white tubes. Burn the lights for 12 to 16 hours. To accelerate growth burn the tubes for longer, up to 24 hours a day. Most seedlings will grow stockiest when the tips of their leaves are placed just a few inches from the tubes. The exceptions are shade-loving houseplants like African violets and foliage plants; they can be grown 6-12" from the lights.

Seed Sowing Techniques

First gather all the materials you will need—seeds, sterile potting material, containers, and pots. Small, four to six inch pots are usually ideal; in this size pot you can sow the seeds far enough apart so they can grow large before they must be transplanted. It is best to sow separate varieties or types of plants in each pot because various plants have different germination requirements and don't sprout at the same time. Other items you will need include labels (use plastic ones; they don't rot), a clear plastic bag or sheet of glass and a pencil or permanent marker (not a ball-point pen; they are not waterproof!).

It is important that the containers used for sowing seeds be sterile. If they are not new pots, they should be scrubbed thoroughly and then soaked overnight in a solution of one part liquid chlorine bleach to nine parts water. This will remove algae and kill disease organisms. Fill the containers with damp potting material. Using a flat object like a piece of wood or bottom of a clean pot, firm the soil in the pot so it is level. Tamp the potting soil to about one half inch below the pot's rim. Don't use drainage or crock material in the bottom of the pots. It is usually dirty, can harbour disease organisms, and with well-drained commercial potting mixes, it is unnecessary.

Sowing larger seeds like geranium is pretty simple. Each seed can be placed about one-quarter inch apart on top of the soil mix. Cover seeds with a layer of potting soil or milled sphagnum moss to a depth of about two-and-one-half times the diameter of the seed.

If the seed to be sown is dust-fine like wax begonias and gesneriads, it's a good idea, before the seed is sown, to sift a one-quarter inch layer of milled sphagnum moss on top of the potting soil. This seeding "bed" will prevent the seed from falling into soil crevices which would bury it too deep and prevent it from sprouting.

Sowing these tiny seeds can be difficult. To make it easier, blend them with a teaspoon or so of very fine sand or sugar, put this mixture in a salt shaker, and sprinkle it on the surface of the seeding bed. The sugar or sand dilutes the seed and makes it easier to spread it out. I usually forsake this sugar or salt method and merely take a pinch of this fine seed and carefully rub the seeds between my fingers. I watch where they hit on the sphagnum moss layer and try to sow them as evenly and thinly as possible. Since these seeds are so small, it is best not to cover them.

Next place the pots of sown seed in a container of warm water (100-120 °F). This will penetrate the potting material faster than cold water and will cause the seeds to sprout quicker. The water level in the container of water should come only to the pot's rim. Leave the pots in the water a few hours, until the soil is thoroughly wet. If the surface of soilless material or milled sphagnum moss

resists wetting, mist lightly with warm water until it is damp. Next, cover the pot with a pane of glass, or slip it into a clear plastic bag (plastic is safer). Place the covered container in a bright, warm place that does not receive direct sunlight.

Most houseplant seeds will sprout in seven to ten days. After they sprout, open the plastic bag or slide the glass pane to expose half of the container. This will help the seedlings gradually adjust to their new environment. Put the seedlings in a bright window or place them four to six inches from fluorescent lights.

After the seedlings have two sets of true leaves (these are much larger than the first "seed leaves" or cotyledons), they can be transplanted. If there is enough space in the original container, allow them to grow until they begin to crowd each other. When transplanting houseplant seedlings, don't put them in too large a pot. In most cases you will want to put them into a two to three inch pot. If they are larger growing plants, they could be moved up later to a six inch pot.

Houseplants to Try From Seed

Herbs have always been popular as winter houseplants. Some of them are easy to grow, compact, and are handy for adding a special touch to a winter salad or soup. Herbs that are recommended for growing indoors are the small-growing basils such as Green Bouquet Basil, parsley, both the Italian and extra curled dwarf, and chives. Herbs grow best in a sunny window or under fluorescent lights in a cool, 55-65°, area.

Some pot plants are ideally suited for a cool greenhouse, a bright window or a cool spot in the basement under fluorescent lights. Special compact varieties of cinerarias, salpiglossis, snapdragons, calceolarias and primroses are perfect for providing dazzling color during the winter.

Annuals should be grown more often as indoor pot plants. They are brightly colored and easy to grow. Good choices include the dwarf varieties of exacum, coleus, celosia, Pot n' Patio asters, and French marigolds such as Happy Days, Cheerful, Queen Sophia, Pigmy, Pretty Joy and Naughty Marietta. These marigolds will bloom in four to five inch pots. To make the plants more bushy, pinch them when they have about three to four sets of leaves. Sow in early October for bloom in mid-to-late January, late November for early to mid-March bloom, and March for May to June flowering. Impatiens are also an ideal pot plant. Choose those varieties which are very compact like the Accent series. When you sow the seed, be sure not to cover them; they sprout best when the seeds are exposed to light.

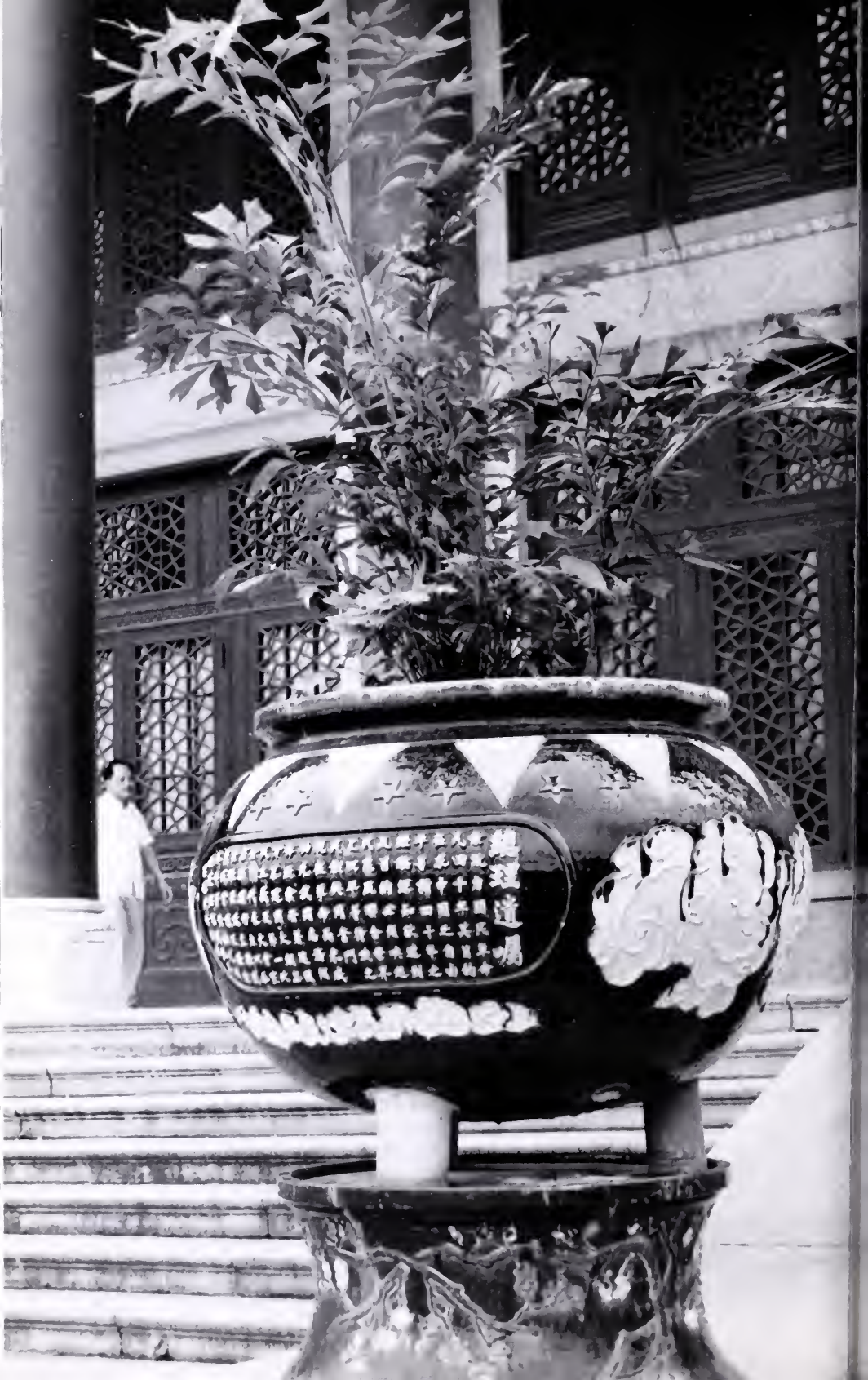
Fibrous or wax begonias are also candidates for indoor growing from seed. Even though the minuscule size of the seed is discouraging, they are easy to grow once they sprout. Try the small-growing varieties such as the Cocktail Series or Linda, Scarletta, or Thousand Wonders Red or White. Calico is another attractive begonia with bronze and green foliage.

One of the favorite annuals that you can grow from seed is the geranium *(Pelargonium)*. Newer hybrids are vigorous and bloom in 15 to 17 weeks. Try Showgirl, Sprinter Series, Rose Diamond, Cherry Border and Earliana.

Many tropical flowering plants are also easy to grow from seed. Most of the gesneriads like gloxinias, kohlerias, smithianthas and African violets are perfectly suited for light gardening. All of them do have small seed, but once they start growing they are not difficult. Gloxinias (or more correctly sinningias) are one of my favorite plants to grow from seeds for holiday gift giving. I start them four to six months before they are needed. Gloxinias respond to increased light so if you want to accelerate growth put the plants in a brighter spot or burn your fluorescent tubes longer. New streptocarpus hybrids from seed are also appearing on the market. These hybrids are beautiful additions to any indoor garden.

A couple of other delightful and unusual houseplants to grow from seed are the dwarf crape myrtle (Little Chief is a good variety) and the dwarf pomegranate. Since both of these are not commonly seen grown as miniature pot plants, they attract attention from fellow gardeners looking for something new.

Growing houseplants from seed is fun and easy. And one of the best reasons I know for growing houseplants from seed is that you will always have extra plants you can share with your gardening friends!



Containers and Potting Mixes

Elvin McDonald

The pot and what we fill it with play major supporting roles to that of the star in this production, the plant. Success is possible in everything from the ridiculous to the sublime, from an old shoe to a Ming dynasty bonsai pot, which in turn might be filled with anything from a single raw ingredient, garden soil, to a complexity of pasteurized ingredients measured according to recipe and mixed under sterile conditions.

Selecting the right pot

Most pots are clay or plastic. Clay weighs more, an advantage if you need to anchor a top-heavy plant, a disadvantage when paying freight or lifting, unless you can turn pot moving into productive exercise. Plants growing in clay require more water than those in plastic, since moisture transpires through the porous, unglazed walls. This can be an advantage for air and desert plants, and can have a welcome cooling effect for pots outdoors in summer.

Both clay and plastic pots are subject to cracking if frozen while filled with soil. However, if idled pots are emptied, cleaned, sorted and stacked, then stored where they will be frozen through winter, this can be a painless way to disinfect.

Plastic pots are indisputably easier to clean than clay. Minor encrustations of mineral salts, found mostly at the rim and around drainage holes, rub or brush off readily after soaking overnight in water that was hot at the beginning. Mineral salts cling much more tenaciously to clay, but can be softened by adding one-half cup vinegar to each gallon of soaking water. Besides a stiff brush and soap pads, you may need a knife to conquer the most stubborn spots.

Clay and plastic pots are available in an array of sizes, from "thumb"—about an inch across the top—to 18 inches or more, and in three basic shapes:

1) The *standard,* as tall as it is wide across the top; for deep-rooted, tall plants.

2) The *azalea* or *three-quarter* is three-fourths as tall as it is wide; besides azalea, this configuration suits a wide variety of flowering and foliage plants and makes a serviceable all-purpose pot.

3) The *bulb pan, half pot* or *squatty pot* is half as tall as it is wide, and is used for shallow-rooted plants such as African violet, trailing rhizomatous begonia and spring bulbs being forced into winter bloom.

It is better not to plant in containers having no provision for drainage. The purpose of one or more drain holes is not only to drain off excess water, but also to permit air to reach the roots. Plants that are fertilized regularly also need to be flushed periodically with water only, a wellness treatment that is not possible in a drainless container.

Which pot for this plant?

Experience is the best teacher for fitting pots and plants. What looks right tends to work in terms of cultural needs, and vice versa. The rule of thumb I use is this: let the size of the pot equal one-half to one-third the height or width of the plant, depending on whether it is primarily vertical or horizontal. This suggests a 6-inch pot for an angel-wing begonia

Here is the ultimate in containers. Located at the Sun Yat-sen Memorial Hall in China it contains a fishtail palm (Caryota mitis).

Rooting test using miniature rose cuttings planted in three different materials. Longest roots and best top growth with perlite followed by cutting in vermiculite and last, the commercial mix which seems to stay too wet.

12 to 18 inches tall, a 4-inch pot for an African violet that measures 8 inches across.

When to repot

It is time to repot when roots fill the pot. This often coincides with the plant's having become top-heavy in relation to the pot. When this occurs during a period of active growth, transfer to a size or two larger pot but disturb the existing rootball as little as possible; add fresh potting mix as necessary to fill.

Complete repotting, in which most of the old growing medium is worked free of the roots and discarded, and a portion of the root system is pruned away, is done at the beginning of a season of active growth. Juvenile plants are typically given a complete repotting yearly; mature specimens may require repotting only every two or three years.

Top-dressing is one way to rejuvenate a plant without complete repotting. This technique works especially well for specimen trees or shrubs in large containers. Late winter and spring are perhaps the best times. Moisten the soil a day or two in advance. Use your fingers to loosen and remove the top 2 to 3 inches of old soil; use a large spoon or trowel to remove more of the old soil around the edges, between the rootball and the wall of the container. Refill with new potting.

Potting mix ingredients

Most of us who grow houseplants are aware, at least subconsciously, that their care constitutes beneficial therapy. Watering, misting, grooming, fertilizing, staking—all these activities are positive ways to relax, to spend quality time. They help me get wound up in the morning and unwind at night.

One of the most therapeutic aspects of growing plants is mixing potting soil. Psychiatric studies show that the farther removed we are from the earth, figuratively or in reality, the greater is our need for living plants and all they represent. If you've ever smelled freshly plowed soil on a warm spring day, you know it is one of the most exhilarating of all scents. When you mix some potting soil for your plants, you can experience this same sensation.

Since it is possible to buy all kinds of different potting soils pre-mixed for specific kinds of plants, you may wonder why I suggest doing it yourself. One reason is that working your hands in the varied textures of different ingredients is highly satisfying. The other is that by adding certain ingredients to packaged mixes you can get better growth responses.

For example, the typical packaged all-purpose potting soil, sometimes labeled for foliage plants, is too dense. I usually mix two to three parts of this with one to two parts

of coarse vermiculite, which is also available in packages where plants are sold.

When I want to repot a flowering plant such as an African violet I start with a packaged soil labeled either for African violets or flowering houseplants. To two parts of this I add one part each of vermiculite and sphagnum peat moss. The vermiculite helps retain moisture but also allows air to reach the roots. Sphagnum peat moss provides valuable humus and assures proper acidity. A potting mix like this works well for most flowering houseplants—African violet, gloxinia, begonia and gardenia, to name a few.

If I am going to repot a cactus or other succulent such as kalanchoe, echeveria or jade plant *(Crassula)*, I start with a packaged mix labeled for cactus. To four parts of this I add one part each of vermiculite and sphagnum peat moss. The reason I do this is that most packaged soil mixes for cacti dry out too quickly and become hard as concrete.

The fascinating thing about mixing your own potting soils is that you can start with almost any packaged mix and make it suitable for whatever plant you want to grow. For instance, to alter all-purpose or foliage plant potting soil for a flowering plant, start with two parts of it and add one part each of vermiculite and sphagnum peat moss. For cacti and other succulents use two parts all-purpose potting soil, two parts clean sharp sand (you can substitute perlite, available in bags where plants are sold, but never use sand from the seashore as it is too salty) and one-half part each of vermiculite and sphagnum peat moss.

If you have access to garden soil or well-rotted compost, you can use it in place of the packaged potting soil, ideally not before it has been put through a quarter-inch mesh screen and pasteurized in the oven at 180 °F for 30 minutes to an hour. Instead of vermiculite—or in addition to—you can use well-rotted leaf mold, also screened and pasteurized; this is especially good for begonias, gesneriads and philodendrons, in particular the self-headers such as *P. selloum* and *P. wendlandii*. In my book there is no substitute for sphagnum peat moss; the dark, powdery kinds do not have the bulk, the fibrous, spongy nature needed to aerate the soil in a pot—today or a year from now.

How much to water

This is a complicated subject, but here let's be simplistic and think in terms of three basic conditions, dry, evenly moist and wet. *Dry* suggests a plant that requires watering well and then not again until the top half inch of soil feels dry to your fingers. Any plant in the dry category will suffer from having its pot stand in a saucer of excess water for more

Don't forget the unusual when selecting containers. Japanese bonsai pots are suitable for many miniature plants such as Sinningia *'Doll-baby' planted in a two and one-half inch pot.*

than an hour. *Evenly moist* describes what most plants need. Water well. An hour or two later pour off any water remaining in the saucer. When a pinch of the surface soil feels barely damp to your fingers, but before it feels really dry, water well again. *Wet* constantly is a condition required by few houseplants. Chinese evergreen (*Aglaonema*) doesn't mind, but it also seems to do just as well evenly moist. *Cyperus* needs to be wet, and of course the aquatics love water so much they live in it.

It is impossible to suggest how often and how much you will have to water any given plant in order to maintain its moisture preference. There are too many variables. Plants growing actively in good light and warm temperatures will require more water than those growing in poor light or coolness. Plants automated to the extent that they receive only electric light of the same intensity and duration day after day also tend to require more water—and fertilizer—than those solely dependent on the whims of the weather and window light.

There is one steadfast rule about watering houseplants: they respond best to water of room temperature or slightly warmer, tepid or lukewarm to the touch.

Potting mix ingredients: Left to right, from top row: White marble chips for drainage and mulch, golden colored vermiculite or exploded mica, granulated hardwood charcoal. Row Two: fir bark chips for potting epiphytes, mulching and mixtures for semi-terrestrial plants, unmilled sphagnum moss. Third row: chunks of hardwood charcoal for drainage, white volcanic rock (medium grade perlite, mixture of peat moss and perlite (Peatlite). Bottom row: broken clay pots or crocks, sphagnum peatmoss, Baccto potting soil.

Fertilizing houseplants

With all the variables, this gets so complicated that for most plants I say simply *while in active growth.* Of course, some plants will be unable to grow actively until you fertilize. During the cooler average temperatures and shorter days of fall and early winter, houseplants in window light need little or no fertilizer. Frequent applications of dilute fertilzer give better results than infrequent, heavy doses. In any event, read the product label.

Shopping for Soil

Dirt, in case you haven't noticed, is not dirt-cheap, at least not at the rate of $2 for four quarts (4.4 liters), which is what I paid recently at a plant shop in my neighborhood. At another, only a few blocks away, I found the same quantity of potting soil for half the price.

The front of the $2 bag promised potting soil "scientifically improved and expertly blended; weed free and ready to use." The word "organic" also appeared. The dollar bag claimed to contain "all-organic potting soil; sterilized; expertly blended. Will not cake."

The back of the $2 bag described its contents as a "scientific blend of compost, peat, perlite and humus, all mixed to a uniform consistency." For half the money I was offered a "scientifically balanced formula combining the proper amounts of quality soil, rich humus and organic additives."

Having read the labels, I next opened both bags, felt the soil with my fingers and then examined it with a magnifying glass. As nearly as I could tell, they were exactly the same, one simply cost twice what the other did.

At the same time I also purchased a two-quart bag of soil labeled "African Violet Mix," for $1.19. It offered a "balance of peat,

organic compost, bark and humus combined with porous rock and conditioners. Correct pH is assured." On examination I detected some "porous rock," probably perlite, otherwise the mix appeared exactly the same as those sold simply as "potting soil."

A bag marked "Cactus Mix," and also "guaranteed not to cake or pack," cost me $2 for four quarts of a "scientifically prepared blend of sterile sand, vermiculite and firm soil as well as the right amount of natural growth elements." Label promises also included "sterilized, non-burning, expertly blended, odorless," the last being disappointing since I consider the smell of healthy soil highly desirable.

Fortunately, when I opened the bag the pleasant aroma one expects from living soil was present. Examination of the mix itself showed more sand than the others but no vermiculite and not, in my opinion, enough humus for a potting mix described as "ideal for all cacti, as well as succulents and all bulbs."

Besides the obvious, that it pays to comparison shop, the conclusions I've drawn where convenience potting mixes are concerned are these:

1) Labels offer only a hint of actual content. "Peat," for example; is it the powdery, brown-black kind that is of little value or that wondrous, fibrous, spongy, reddish-brown sphagnum peat moss that is universally recommended for potting mixes and general soil improvement?

2) The words "expert" and "blend" have little meaning until you've proven them true in your own environment and with your own watering and fertilizing habits. The mixes I sampled seemed also to have been screened so finely that "blend" took on negative connotations, as if the ingredients had been put through some giant processor that reduced every particle to the size of a tiny grain of sand.

3) Most packaged potting soils are best used as one ingredient in mixtures "blended expertly" by your own hands—for the specific kinds of plants you are about to pot. This saves money, gives better results and lets you enjoy more time in beneficial physical contact with the soil.

Potting Mix Recipes

Time-honored All-purpose Potting Soil

1 part garden loam or packaged all-purpose potting soil
1 part sphagnum peat moss
1 part perlite or clean, sharp sand

For African violet, Chinese hibiscus, gardenia, other flowering types: add an extra portion of sphagnum peat moss.

For cacti and other succulents from dry regions: add an extra portion of perlite or sand.

Cornell Peat-Lite Mix A

For one bushel of mix, good for seeds or repotting plants:
4 gallons #2 or #3 horticultural vermiculite
4 gallons shredded sphagnum peat moss
2 level tablespoons dolomite limestone (do not use hydrated or "quick" lime)
2 level tablespoons 20 percent superphosphate
2 level tablespoons potassium nitrate *or* calcium nitrate

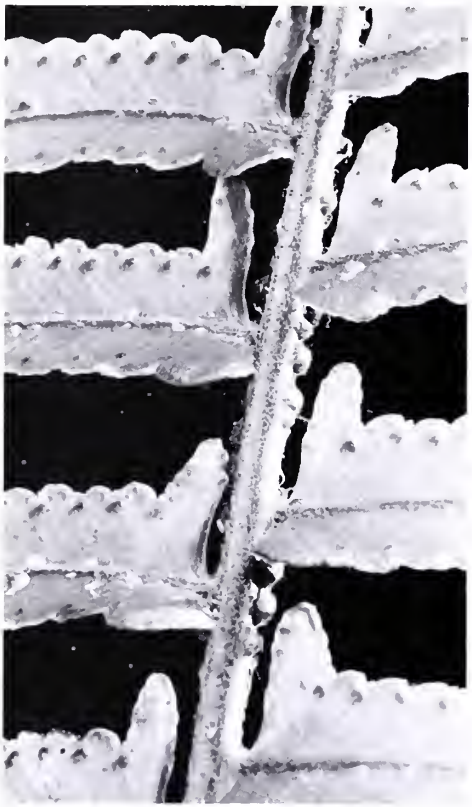
Add one pint warm water to the peat moss to moisten. Put all ingredients into a large plastic bag; inflate by blowing into the end. Twist closed to keep inflated. Now shake, roll and tumble the contents to mix well. Use at once or store in the bag.

Fertilizer added at mixing will last for three weeks of growth, then it will be necessary to fertilize regularly using a water-soluble fertilizer such as 20-20-20.

Cornell Epiphytic Mix

For one bushel of mix that may be used for aroids (aglaonema, dieffenbachia, scindapsus, philodendron), bromeliads, cacti, orchids, peperomia:
⅓ bushel sphagnum peat moss
⅓ bushel medium grade horticultural perlite
⅓ bushel Douglas, red or white fir bark (1/8-1/4" size)
8 level tablespoons dolomite limestone
6 tablespoons 20 percent superphosphate
3 tablespoons 10-10-10 fertilizer
1 tablespoon potassium nitrate
3 tablespoons granular wetting agent

Control of Pests and Diseases



Notes from Guest Editor

Charles Marden Fitch

From time to time even the best cared for indoor plants will suffer from pest attacks or diseases such as mildew or rot. Pests are often introduced with newly acquired plants. I have a standing joke about a few careless commercial nurseries that they give you free mealybugs with every purchase!

Most commercial growers try to keep their plants free from pests yet the pests are just as eager to infest their favorite foods. Here are some suggestions for keeping your indoor plants healthy.

1) Before buying plants, inspect them for obvious signs of pests or disease. Don't buy specimens that look sick or are infested with pests.

2) Isolate new plants from your established collection for several weeks. During this time watch for pests that may appear from hatching eggs or the soil. Pesticide sprays frequently kill adults but not the eggs or underground pests.

3) Create a healthy environment around your plants. Provide adequate air circulation to discourage mold, rots, and mildew. Furnish adequate humidity and water early in the day so leaves are dry by nightfall.

4.) When you find a problem, take immediate action. Mildew and rot spread quickly and

Soft brown scale insects can be seen along the center stem of this Boston fern. Tiny white specks seen on the leaflets are young scale insects. The regularly spaced light brown dots along the top of each leaflet are normal sori which release reproductive spores of fern.

Water resting in the center of this Aloe polyphylla *started rot which finally killed the plant.*

insects spread to nearby plants. If you are unsure of the cause of the problem take an affected plant to a nearby expert for help. Garden centers, plant shops, garden club members, county agricultural agents, botanical gardens, university botany/agricultural departments are all places that will usually provide diagnostic assistance.

5) Treat pests and diseases with appropriate remedies. Local garden centers and nurseries usually offer products designed to control specific problems. For maximum personal safety use products approved for indoor application.

6) Discard plants with terminal problems. If a plant is covered with scale or almost dead from rot it is better to get rid of the specimen and start anew with a healthy plant.

Pests

The most troublesome pests for indoor plants and suggested treatments follow:

Aphids: Wash off the pests with warm soapy water (SAFER Insecticidal soap or Ivory).

Caterpillars: Pick off and throw out these chewing pests. I feed them to my carnivorous *Nepenthes.*

Sometimes insecticides which are safe for houseplants may cause flower damage as can be seen on this African violet. The foliage has not been damaged.

Aphids suck sap from Hedera *'Curlilocks.' Shed skins of the insects are seen on the leaf below the ivy stem encrusted with fat gray aphids.*

Mealybugs: Pick off all exposed clumps.

Mites: Red spider mites are common on thin-leaved plants under dry sunny conditions. Wash plants under lukewarm water.

Scale: Scrape off all accessible scales. Wash plants with soapy water (Ivory or SAFER Insecticidal Soap).

Whiteflies: Spray with insecticidal soap every three to five days.

Rots and Mildew

Discourage root rot by letting soil dry slightly between watering. For dampoff of seedlings and new cuttings use a drench of Banrot or similar product offered in garden stores for treating soil and potting mixes to control dampoff rots. Many rots and fungus problems spread by splashing water and using unclean cutting tools. Keep your collection free of diseased leaves. Flame sterilize cutting tools between use on different plants, avoid overhead watering where mildew and leaf rots are a problem. Keep a fan going all the time to encourage air circulation around the plants. Rots, fungus, mildew flourish in still moist air.

Basic information about. . .

Houseplants Under Lights

Charles Marden Fitch

Renanthopsis *Fiery Gem has a compact growth habit and peach-red flowers peppered with darker spots.*

Using fluorescent lights to supplement daylight or to create indoor light gardens gives one freedom to grow houseplants almost anywhere. Some of my most beautiful tropicals are grown in the basement under fluorescent lamps. When the plants are at their blooming best they are given display space in the living room, on a dining room table or in a similar prominent location. Such a system lets me utilize space in an already heated, easily accessible place where I only have to provide adequate light and humidity.

Friends of mine have built virtual greenhouses in their basements, thus having no trouble from storms, cloudy days, extra cold weather—or excessively high heating bills. Even more exciting are attractive light gardens designed to be a decorative part of an indoor living area. For example, a feature of my own living room is a wall-mounted light garden kept in good condition by a combination of early morning sunlight and three 40-watt fluorescent lamps. This particular unit is made by a commercial firm (Marko Company) specifically as a light garden that will fit into decorated interiors while still providing sufficient illumination for sturdy growth of flowering houseplants. It is forty-eight inches long and twelve inches high, a size quite compatible with the average room.

Light gardens in living areas, as contrasted perhaps with those in spare rooms or the basement, should be designed as attractive features where plants can be seen at their best. To avoid glare from the lamps a wedged louver can be used just under the fixture. A louver with a waffle-type pattern of holes

Fluorescent self-standing fixture has two 20-watt lamps. Plants grown under broad spectrum fluorescent tubes are left to right: Rex begonia 'Shirt Sleeves,' Chirita sinensis, Ficus pumila minima. *In the back is red dwarf orchid* Sophrolaeliocattleya *'Tiger Eye,' and* Pelargonium *'Little Gem.' The mirror foil beneath the Mexican pottery reflects light and duplicates the scene.*

permits most of the lamp light to fall directly upon the plants but will prevent direct viewing of the bulbs from the side or above. Some manufacturers offer indoor light gardens already equipped with these wedged louvers. You may also obtain the louver material for use in custom-made light gardens in hardware stores.

Several portable light gardens resembling furniture are offered in catalogs and at garden shops. Those with only one or two lamps are suitable for foliage plants and certain flowering subjects with low-light requirements such as African violets, especially if the light garden can be placed where plants receive some supplemental daylight.

Light garden carts with two to four tiers, each carrying a waterproof shelf under an efficient fixture, are very practical for growing plants in a limited space. Although the basic design of the tiered light gardens is more functional than decorative, one can customize these units to suit personal taste. For example, I didn't like the shiny metal on one of my tiered units, but a can of metal paint let me change the impression immediately. Vines and trailing plants can be effectively used to soften the edges and hide unattractive features of a light garden. One might also build a shell or false front to enclose the functional tiered light garden.

Whatever the design, one must allow for adequate air circulation. Except for propagating cabinets where a constant high temperature might be an advantage, the usual light garden should be kept between 60° and 75°F. Since the ballasts required for fluorescent lamps generate heat, there must always be some way for this heat to escape. If a light garden is enclosed, provision must be made for ventilation, such as an open top or drilling a number of holes (perhaps in decorative shapes) around the base or sides of a cabinet.

Humidity

Extra humidity can be furnished in a light garden by growing plants on moist perlite or gravel. Roots will escape through the container drainage holes, however, making rearrangement of the pots difficult after a few months. Such outside rooting can be prevented if pots are placed on saucers or a

Exacum affine *'Midget' (back) and* Peperomia *'Little Fantasy' GROWN UNDER THREE DIFFERENT SOURCES OF fluorescent light show marked variations in plant habit. Plants grew fastest under Wide Spectrum Gro-Lux and also bloomed well. The most compact growth but fewer flowers occurred under standard rosy-hued Gro-Lux. The Vita-Lite lamps are the same color as sunlight.*

wedged louver above the moist material. In fact, with truly waterproof trays under the plants one can keep an inch or two of water in the tray, then place pots on a wooden or wire grid above this miniature "lake." Normal evaporation of the water will furnish extra humidity. Caution: plant roots should never be waterlogged.

Light Choice

Indoor plants will grow under all of the commonly available fluorescent lamps. If natural color is very important, as in a dining room, you may want to use lamps that have a color similar to noon sunlight. Among such kinds are GE Chroma-50, Vita-Lite and Verilux, which are broad-spectrum lamps. Cacti and orchids are some of the high-light-requirement plants that thrive under broad-spectrum lamps, provided that intensity is adequate.

For slightly warm tones, but an excellent spectrum for plants that are grown for their flowers, choose one of the horticultural broad-spectrum lamps such as Agro-Lite or Wide Spectrum Gro-Lux. These are more expensive than common household lamps such as cool white and warm white, but they furnish a better spectrum of light for those plants which grow better under such illumination.

Most foliage plants and African violets will do perfectly well under a combination of one cool white and one warm white fluorescent lamp, so if budget is an important factor you will want to choose these least expensive lamps for such plants.

A "theatrical" impression is created by Gro-Lux lamps, the first and most famous horticultural lamps. Standard Gro-Lux lamps cost more than the Wide Spectrum Gro-Lux, but they are the only ones that have a deep pink color. The warm-colored light makes flower and leaf color glow. Rex begonias and African violets look spectacular under standard Gro-Lux lamps, as do red-toned orchids. Plants grow compactly under them, too.

Distance and Other Points

High-light-requirement plants such as most orchids, succulents and bromeliads look best with foliage two to six inches under the lamps. Keeping the plants too far away means that the light may be too dim for maximum flower production and compact growth. Houseplants with lower light requirements, such as foliage plants, rex begonias and African violets, will thrive ten to fifteen inches under two to four lamps. Since light diminishes at the ends of fluorescent lamps, it is more efficient to use the longest lamp possible, rather than put two smaller lamps end-to-end.

For plants with high-light requirements, provide a minimum of four lamps per fixture for optimum growth and flowering. My basement fixtures each have four 40-watt lamps. For orchids and succulents I use all four, but for foliage plants and African violets I use only two. Plants given too much light grow compactly, may not display flowers correctly and often have a sickly yellow appearance. Plants given too little light intensity will lose character by growing spindly and elongated, lack color or turn very dark green. Plants provided with the correct intensity look well balanced, have the color and shape characteristic of the species and display flowers without having unduly elongated stems.

The best way to time light-garden hours is with an automatic timer to turn the fixtures on and off, according to your program. Most houseplants grow well with a fourteen to sixteen hour day. In the winter one might set the timer to provide an eleven to twelve hour day, which is required by a few plants such as rhizomatous begonias if they are to bloom. After two months of short days (eleven hours) begin a long-day cycle again, so that by spring the light garden is receiving fourteen to sixteen hours of light.

Learn More

Detailed suggestions concerning this subject, plus designs for several indoor light gardens, will be found in *The Complete Book of Houseplants Under Lights* (Charles Marden Fitch, Hawthorne Books), available at most libraries. Some of the lamp manufacturers, such as Duro Test (Vita-Lite) and Sylvania (Gro-Lux), offer free folders with light garden suggestions.

If you wish to learn more about this kind of gardening write to the Indoor Gardening Society of America, c/o Horticultural Society of New York, 128 West 58th St., New York, NY 10019. The Society has many local chapters where members are pleased to provide personal advice. The bimonthly magazine always has several articles for beginning light gardeners, plus useful addresses for light garden supplies.

Floral cart with the exterior of reflectors painted. Pots rest on moist gravel.

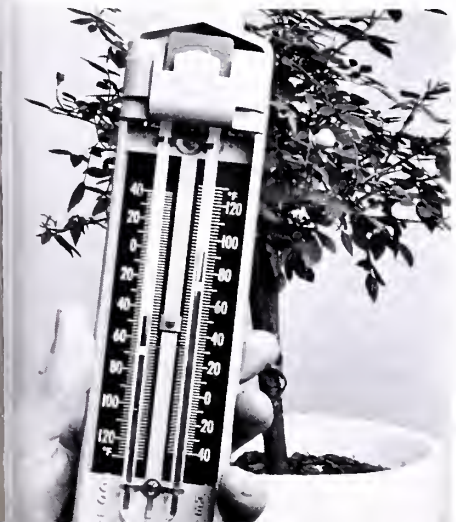
Some Mail Order Sources For Indoor Plants and Seeds

Firms:	Specialities/Catalog:
Abbey Gardens 4620 Carpinteria Ave. Carpinteria CA 93013	Cacti and other succulents. Catalog $2.00
Alberts & Merkel Bros., Inc. 2210 S. Federal Highway Boynton Beach FL 33435	Aroids, bromeliads. Free list to Plant Society members.
Altman Specialty Plants 553 Buena Creek Rd. San Marcos CA 92069	Cacti and unusual succulents. Catalog $1.00
W. Atlee Burpee Co. 300 Park Ave. Warminster PA 18974	Seeds and plants of popular house-plants. Catalog free.
California EPI Center P.O. Box 1431 Vista CA 92083	Epiphytic cacti, hoyas. Catalog $1.00
Gesneriad Research Foundation 1873 Oak St. Sarasota FL 33577	Unusual gesneriads. Send stamped self-addressed envelope for current list.
Glasshouse Works Box 97 Stewart OH 45778	Aroids, gesneriads, foliage, succulents. Catalog $1.50
Kartuz Greenhouses 1408 Sunset Drive Vista CA 92083	Begonias, gesneriads, other rare exotics. Catalog $2.00
Lauray of Salisbury Undermountain Rd. Salisbury CT 06068	Begonias, gesnariads, succulents. Catalog $1.75
Logee's Greenhouses 55 North St. Danielson CT 06239	Most exotic plants, especially begonias and geraniums. Catalog $3.00
Merry Gardens Camden ME 04843	Foliage, geraniums, begonias. Catalog $1.00
Mini-Roses P.O. Box 4255 Sta. A Dallas TX 75208	Miniature roses. Catalog free.
Nor'East Miniature Roses 58 Hammond St. Rowley MA 01969	Miniature roses. Catalog free.
Geo. W. Park Co. P.O. Box 31 Greenwood SC 29647	Seeds and plants of many indoor plants. Catalog free.
The Plant Kingdom Att. Patrick Worley Box 7273 Lincoln Acres CA 92047	Hybridizer of begonias and gesneriads. Many unusual exotic plants. Catalog $1.00
Rainbow Gardens P.O. Box 721 La Habra CA 90631	Epiphytic cacti, hoyas. Catalog $1.00
Rhapis Gardens 100 Rhapis Rd. P.O. Box 287 Gregory TX 78359	Rhapis palms, rare cultivars. Catalog $1.00
Rosehill Farm Gregg Neck Road, Box 406 Galena MD 21635	Miniature roses. Catalog free.
Sequoia Nursery 2519 E. Noble Ave. Visalia CA 93227	Miniature roses. Catalog free.
Thompson & Morgan Seedsmen P.O. Box 1308 Jackson NJ 08527	Seeds of most exotic houseplants. Catalog free.
Tropiflora 2570 Tallevast Rd. Sarasota FL 34243	Bromeliads. List $2.00 include credit coupon for order.

Plant Society Lists

African Violet Society of America P.O. Box 3609 Beaumont TX 77704	Illustrated magazine. Shows.
American Begonia Society P.O. Box 502 Encinitas CA 92024	Illustrated magazine. Shows/convention.
American Gloxinia & Gesneriad Society P.O. Box 493 Beverly Farms MA 01915	Illustrated magazine. Convention/show.
American Orchid Society Inc. 6000 South Olive Ave. West Palm Beach FL 33405	Illustrated magazine. Monthly judging in 18 regional centers.
The American Plant Life Society P.O. Box 985 National City CA 92050	Journal of bulbous plants such as the amaryllis family.
The Bromeliad Society, Inc. 2488 E. 49th Tulsa OK 74105	Illustrated magazine. Shows/convention.
Cactus and Succulent Society 2631 Fairgreen Ave. Arcadia CA 91006	Illustrated magazine. Shows.
The Cryptanthus Society 2355 Rusk Beaumont TX 77702	Publication, advice.
Gesneriad Research Foundation 1873 Oak St. Sarasota FL 33577	Bulletin, rare plant offerings, research.
Hoya Society International P.O. Box 54271 Atlanta GA 30308	Illustrated bulletin.
Indoor Citrus & Rare Fruit Society 176 Coronado Ave. Los Altos CA 94022	Publication, advice.
Indoor Gardening Society of America Inc. 128 W. 58th St. New York NY 10019	Publication, show.
International Aroid Society Inc. P.O. Box 43-1853 South Miami FL 33143	Journal, shows.

Maximum-minimum thermometer will provide precise information on the high and low temperatures in any area.



The plant society groups listed here are often run by dedicated volunteers. From time to time an address may change when the membership secretary changes. The most current society address will be found in the society publications, available at botanical garden libraries. When writing for membership information enclose a self-addressed stamped envelope.

Join a plant society to receive the publication, participate in round robin letters, learn more about growing your favorite plants. Some of the plant societies have seed funds, local chapters, and yearly conventions.

C.M.F.

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68 HERBS AND THEIR ORNAMENTAL USES
69 THE HOME VEGETABLE GARDEN
80 DESIGNING WITH FLOWERS
76 DRIED FLOWER DESIGNS
46 DYE PLANTS AND DYEING
72 NATURAL PLANT DYEING
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101 ORIENTAL HERBS AND VEGETABLES

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GARDEN ORNAMENTS

PLANTS & GARDENS
BROOKLYN BOTANIC
GARDEN RECORD

Gazebos, Sundials,
Fences, Benches,
Gates, Sculpture,
Sources

VOL. 43, NO.
3

PLANTS & GARDENS

BROOKLYN BOTANIC GARDEN RECORD

Garden Ornaments

1987

Brooklyn Botanic Garden

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PLANTS & GARDENS
BROOKLYN BOTANIC GARDEN RECORD

Garden Ornaments

Vol. 43 1987 No. 2

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Crocosmia *'Lucifer' blooms around water pump in Connecticut garden of Frederick and Mary Anne McGourty.*

Cover photograph by Elvin McDonald

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foreword

Gardens as extensions of the house are additional living space and also outdoor rooms to be furnished. Places to sit require benches and/or chairs. If a shady place is needed, a gazebo or arbor might provide the answer.

When creative comforts have been provided, then it is time for embellishments—sculpture, fountains, a pool, a sundial. Fences add privacy, interest and detail.

Found objects will lend a personal touch to the outdoor room. Prizes obtained from garage sales, secondhand stores or walks on the beach can be art forms or serve more functional purposes depending upon the nature of the find.

If documentation is needed to confirm the resurgence of interest in garden ornaments, garden catalogs provide pages filled with every ornament imaginable and then some. In fact some catalogs deal exclusively with garden ornament and are listed in the handbook.

Further evidence of the popularity of garden ornamentation was found last spring at the New York and Philadelphia flower shows as well as the famed Chelsea show in London. A vast assortment of benches, garden sculpture and gazebos was displayed in the exhibits.

Peter Loewer has selected a most knowledgeable group of contributors from the U.S. and England. They provide historical background and up-to-date information on just about every aspect of garden ornamentation.

We hope that you will be inspired to expand your garden "room" and furnish it with artful objects.

Barbara B. Pesch
Editor

This handmade wood gate in the traditional Colonial American starburst pattern stands in a Batavia, Illinois, garden, and is thought to be over a hundred years old. The hinges are wrought-iron, the wood posts hand-turned.

An Introduction to Garden Ornament

Peter H. Loewer

Twenty five years ago in America when most people thought of garden ornament, a picture flashed across their minds: the garden gnome, made of concrete, and dressed in primary colors of red and blue, standing alone or holding court with one or more pink flamingos. In fact one of the leading American garden periodicals of the day, carried a full page advertisement devoted to Papa Hans and his garden dwarfs: Gustav, Otto, Hans, and Fritz.

England in spite of a glorious history of garden ornament was in much the same fix. What follows is the description of a typical installation by the mystery writer Douglas G. Brown in *Too Many Cousins:*

> The strip of front garden was a epitome of Mortimer Sherby's peculiar ideas of landscape gardening. Little stone figures—an elf, a crane, a rabbit, and a penguin—ornamented the corners of the tiny lawn. A sundial rose in the middle and beneath the window with the pink silk curtains a stone seat bore inevitably but inexcusably the inscription 'A garden is a lovesome thing, God wot.' A path flagged with extremely crazy paving crossed this pleasaunce to the front door.

Today the gnome is still in evidence as witness the usual run of concrete reproductions found at the typical nursery or garden center. There amidst the frogs and dwarfs are now seen Japanese lanterns, Renaissance putti (a figure of a young boy), brass sundials, stone casts of Roman faces, and portable fountains—but be warned, for even those dealers who are dedicated to high garden art often make visual misjudgments equal to or even below the nose of a gnome. But happily, the garden world is changing and thanks to garden clubs, periodicals, lectures, books, publications by botanical gardens, and television, most of the changes dealing with the environment of the garden are certainly for the better.

But the world of the garden is more than a piece of concrete artfully placed. The following articles tell of the rich history of the American garden. Articles highlight in terms of ornament; that underground fantasy, the English grotto; gazebos; art on city garden walls; sculpture for land or water; sundials; fences; medieval turf seats; furniture; the use of plants as ornament both in and out-of-doors; the looks of a garden; and finally, the books and sources that deal with the best of garden embellishment.

Peter H. Loewer is a botanical artist and scientific illustrator who writes many magazine articles and writes and illustrates his own books on gardening. His most recent book was Gardens by Design *and he is now at work on a book entitled* The Annual Garden.

Sundials

Peter H. Loewer

Reprinted with permission from the American Horticulturist *August, 1986*

Last summer I installed an antique sundial in the center of our back garden. It was not an easy job, since the type I purchased is a variation of the armillary sphere, consisting of a set of three interlocking rings, each of which is about 19 inches in diameter. All of the rings are held up to the heavens by a tiny figure of Atlas. One ring holds a copper band inscribed with numbers representing the hours of the day; the second ring supports an arrow that acts as a gnomon to cast the sun's shadow; and the third, inscribed with degrees of latitude, supports the other two and is attached to the Atlas figure.

This device requires a solid support—one that is perfectly level and plumb, yet high enough to be read with ease and still be in scale with the rest of the garden. Luckily, I had an old two-foot-long concrete drainage tile—six inches square and perfectly plain—that could be used as a support for the dial. An afternoon's work—along with a bag of ready-mix concrete, some gravel and a carriage bolt to hold the sphere's base—turned this tile into the base for a garden ornament that is both aesthetically pleasing and practical.

I dug a foot-deep hole, lined it with gravel for proper drainage, topped the gravel with a concrete block, then placed the tile six inches below the surface of the ground. I then filled the hole with concrete (making sure it flowed freely into the base), inserted the carriage bolt and smoothed the area around the bolt's threaded tip. I left everything alone for three days to allow the concrete to dry. Finally, under a brilliant afternoon sun, I bolted the base of Atlas to its new pedestal after using a compass to make sure the arrow pointed north. Then I adjusted the

The simplest of sundials with gnomon (pointer or shadow arm) dates from the ancient Romans and is here seen mounted on a classic Greek pedestal.

Photos by Ewin McDonald

vertical ring that Atlas holds so that it agreed with our latitude, and watched the shadow of the arrow's shaft pass just beyond the numeral "3." With a rapidly beating heart, I glanced at my watch. It read 3:05. The date was April 13. Miraculous!

About Sundials

The sundial is an instrument that indicates the time of day by the shadow cast on the surface—marked to show hours or fractions of hours—of an object on which the sun's rays fall. Any object whose shadow is used to determine time is called a gnomon (originally from the Greek *gnomos*, meaning "one who knows"). The shadow-casting object is usually a style, pin or metal plate.

Poles, upright stones or possibly bones were used as gnomons by early man. For example, when on the hunt, advance scouts of Indians in Labrador would set a stick upright in the snow and mark the line of the shadow that was cast. About three hours later, the women of the tribe would appear, heavily laden with fuel and provisions. By noting the difference between the present shadow and that marked by the men, they would know whether they had time to rest before continuing on their way.

Most of these ancient "sundials" were so makeshift that they did not last through the ages. The true sundials—both portable and permanently fixed types—were probably first used either in Egypt or in Mesopotamia. The oldest existing sundial is an Egyptian instrument (circa 1500 B.C.) consisting of a flat stone on which is fixed an L-shaped bar, much like a carpenter's square. The bar's short, vertical limb casts a shadow that is measured by markings on the longer horizontal limb.

In the first century A.D., the accuracy of sundials was greatly improved when it was discovered that by setting the gnomon's direction parallel to the earth's axis, the apparent east-to-west motion of the sun determined the swing of the shadow. However, the development of sundials slowed during the so-called Dark Ages that led up to the projected end of the world set for 1000 A.D. Finally the world "awoke" in 1001, the church renewed its interest in the holy calendar, and time-keeping advanced once again.

Yet time continued to be only a way of marking intervals between church holidays, which were important to the astrologers and astronomers. For most people, morning, noon, afternoon and evening were all the measurements needed to live through a typical day. Therefore, it is not surprising that the sundials and water clocks of antiquity were more or less unpredictable in their ability to measure the passage of time accurately. It was not until a successful pendulum clock was invented by the Dutch scientist Christian Huygens in the middle of the 17th century that mankind at last had a timepiece that was accurate.

During the Renaissance, sundials of great complexity and fantastic design were developed. By the 1600's installation had become so simple that any carpenter or homeowner could lay out the hour lines with a high degree of accuracy. The most familiar design then—as now—was the round or square plate of metal inscribed with numerals and topped by a triangular gnomon, which was usually placed upon a pedestal. Almost as popular were the vertical dials, which were often installed in public squares on the south side of the town hall. Unlike the horizontal varieties, these sundials had to face exactly south and were read counterclockwise.

Floral sundials were also common during the Renaissance. Live flowers were used to make the dial, and the gnomon was usually a trellis covered with vines. These sundials were sometimes so elaborate that they defied description. Lady Warwick of Essex, whose garden included a floral dial, wrote, "Never was such a perfect timekeeper as my sundial, and the figures which record the hours are all cut out and trimmed in box [*Buxus* spp.], and there again on its outer ring is a legend which reads in whatever way you please: *Les heures heureuses ne se comptent pas* [The happy hours cannot be counted]. They were outlined for me, those words, in baby springs of box by a friend who is no more, who loved my garden and was good to it."

Sundials based on armillary spheres like the one in my garden were also popular. These were eventually simplified to form the equatorial dial, which consisted of two half-circles, one of which held the numbers, and the other, the arrowhead gnomon.

Finally, there was the noon cannon, a design that originated in the early 17th century and was honored by Noel Coward in *Mad Dogs and Englishmen* with the lines, "In Hongkong / they strike a gong / And fire off a noon day gun / To

reprimand each inmate / who's in late." This particular dial used a brass-mounted lens with an adjustable arm to focus the sun's rays on a charge of black powder; thus, a tiny cannon exploded with the arrival of noon. Noon cannons were often used in the 19th and early 20th century on plantations in India to let workers know when it was time for a rest.

One of the largest and most unusual sundials ever made is in Jaipur, India. Constructed in approximately 1724, it covers almost an acre of ground and has a gnomon over 100 feet high with a complete observatory on top.

Among the more interesting and ingenious sundials constructed in England was that of Sir Isaac Newton. Newton's dial consisted of a small, circular mirror that was fixed to a windowsill and reflected the sun's rays on the ceiling of his room, which was painted with hour lines and numerals.

Another unique sundial was executed in stone in 1622 by Nicholas Stone, a close associate of British architect Inigo Jones. The sundial was designed by Edmund Gunter (the man responsible for the terms cosine and cotangent) for the king's Privy Garden at Whitehall. It consisted of a dozen dials that showed a dozen different astrological times and surrounded a large, concave dial at the center. In 1699, the Reverend Francis Hall, a professor of mathematics at Liege, designed and built a great pyramidal dial for Charles II in the same garden that consisted of 271 different and smaller dials showing the time according to the Babylonian, Italian, Jewish and astronomical ways of counting. In addition, the dial included various other figures associated with contemporary astronomy, geography and astrology.

During the Revolutionary War in America, portable dials were used instead of watches. George Washington owned such a dial, which he carried, along with a compass, in a delicately wrought, oval-shaped, silver case. Even when watches came into general use by the 18th century, most people felt they could not depend on such mechanical contrivances, and the local sundial was still used to check for accuracy or to set the time.

Finally, the French developed an instrument called the heliochronometer, which employed the sun to cast the shadow of a fine wire on a carefully calibrated dial. This instrument was used to set the watches of all the French railroad men until the early 1900's.

Mottoes on the Dial's Edge

Throughout the centuries, sundial aficionados have not only written about the timekeeping devices; they have also felt compelled to inscribe mottoes on the dials themselves. Among the mottoes that have appeared around the outer edges are "I count none but sunny hours," which is a corruption of a motto chosen by Queen Alexandra for the sundial at Sandringham: "Let others tell of storms and showers, I'll only count your sunny hours"; and "A clock the time may wrongly tell, I never if the sun shine well." The ever-popular "Grow old along with me, the best is yet to be" is also found on many dials.

More unusual mottoes, featured in an early 20th-century book entitled *A Book of Sundials,* include the one on the dial installed in the King's Garden, Holyrood. Presented by Charles I to Queen Henrietta Maria, it read, "United in time, parted in time, to be reunited when time shall be no more."

A dial in the garden of Harriet Martineau read, "Come light visit me." Appropriately, the dial of a public house near Grenoble noted, "This is the hour of drinking." Other intriguing mottoes include "Some come some go, this life is so" and "My houres are made of sun and shade, take hede of what your houres be made." A favorite line of mine written by Publilius Syrus (c. 42 B.C.) would be perfect for inscribing on a gnomon: "Even a single hair casts its own shadow."

Sundial Time

Scientists recognize three principal types of time: sidereal, apparent solar and mean solar.

Sidereal time is used mainly by astronomers. It is a measurement of the time it takes for one complete rotation of the night sky, that is, the time required for a star to return to the same spot overhead that it occupied the night before (about 1/365 of a year).

Apparent solar time measures the solar day and is read on a sundial. It is the time it takes for the sun to appear in the same spot in the sky, day by day. These measurements add up to about 365¼ solar days, which equals one solar year. Now, instead of changing our clocks by one-quarter of a day each year, we use a 365-day year with one 366-day leap year every four years.

It is surprisingly difficult to keep accurate time by the sun alone. Because of gravitation, the earth travels at different speeds as it journeys along its orbit. As a result, sundials are absolutely

Armillary or equatorial sundial mounted on a handsome pedestal makes an effective garden focal point in all seasons.

correct only four times a year: December 25, April 16, June 15 and September 1. The rest of the time, they are either slow by as much as 16 minutes or fast by up to 14 minutes. By consulting a chart called the "equation of time," sundial owners who are particular about accuracy can adjust their instruments to match their watches.

The third form of time, mean solar time, averages out the differences in apparent solar time and gives us an artificial but exact 24-hour day.

In addition to the three major types of time recognized by scientists, there is earth time. Since it is impossible for each place on earth to have its own local time based on a noon hour (that is, when the sun is directly overhead), the earth has been divided into standard time zones. Each of these zones is 15 degrees longitude in width; 360 degrees represents the whole earth. The time in two neighboring zones differs by one hour. Thus, if you move east, you set your watch ahead; west, you set it back. The Royal Observatory in Greenwich, England, is the place where earth's time zones begin and is considered 0 degrees. In the United States and Canada, four standard time zones were adopted by the railroads in 1883 and were eventually adopted by the citizens and the government. The zones were named Eastern Standard, zone 5; Central, zone 6; Mountain, zone 7; and Pacific, zone 8. Intercolonial, or Provincial, time corresponds to the 60th meridian and is one hour earlier than Eastern Standard time. It is used by Halifax and a few adjacent cities in Canada.

If you live directly on a time meridian for the particular time belt in which you live, your dial will register the standard time of your region. Time meridians (found by multiplying 15 degrees by your zone number) for the various zones in the United States are as follows: Eastern, 75th; Central, 90th; Mountain, 105th; and Pacific, 120th. If you live east or west of these lines of longitude, the time shown on your sundial will be earlier or later than the actual standard time of your region.

Installing Your Sundial

When you buy a horizontal sundial, the manufacturer usually asks your latitude or sends you a dial with an average setting for the United States or Canada. (The width between the numerals should be plotted for your particular latitude.) The armillary type can be easily adjusted to your specific situation.

When installing a sundial or using the portable variety, keep in mind that the place upon which the instrument sits must be absolutely level. Any deviations will change the gnomon's shadow and will result in an incorrect reading. For the same reason, the gnomon must be absolutely perpendicular to the earth's surface.

Any sundial that you may find will be of use in your garden. However, you will probably have to adjust your dial for it to show reasonably correct time. If you are a purist, you will need to plot compass points to magnetic north and not true north.

If you wish to forego complicated instructions, just set your sundial in place about noon. When there is no shadow on the dial except a mere slit and the gnomon is pointing due north, the gnomon's shadow is exactly on the north-south axis of the earth, and it is noon in your garden. Of course, it might not be noon according to the radio or your clocks, since you will be reading apparent solar time.

Our remote ancestors were far less conscious of time than we are. Today, the only peaceful and unhurried time left to us may be the time spent in the garden. There, the dark line moving slowly across your figured dial tells us that there is still time to linger before the night drives us back inside.

Gazebos

J. Liddon Pennock, Jr.

There are many components that contribute to creating a truly great garden. The primary component is obviously plants. They must be blended together, using a discerning eye, a sense of form, texture, design, and a feeling for the proper use of color. The end result will be your own horticultural triumph.

In order to properly view a garden one should provide well-planned walks. These walks or paths form the backbone of the garden's design. The choices of suitable material are many: turf, pebbles, flagstone, and brick are but a few. These paths lead from one location to another and point up the fact that there is a need for a terminal feature.

This need can be met by a piece of sculpture, a pool, or a fountain. But the most dramatic and functional solution and one that gives an added architectural quality is a gazebo. Its merit is that it will provide a place to sit while shaded, enjoying the surrounding dappled wonderland you've created.

The style of the gazebo establishes the feeling that you wish to emphasize. It might stand majestically at the end of a long allée edged with trimmed boxwood and flanked with masses of perennials. On the other hand a rustic shed, built with bark-covered posts holding a roof of heavy hand-split shingles, might easily be placed along a meandering path in a wild garden.

A gazebo serves myriad uses. Standing beside a swimming pool, it might be used as a changing room. It could be equipped with refrigeration and other facilities for cooking, making it a convenient extension of the residence. It might also serve for storage or merely a place to sit.

In the early days European gardens were usually fenced or surrounded with walls for protection. Often a roofed structure was built as part of the wall for the storage of equipment. Originally such walled grounds were used for producing food. Later, decorative plantings were added and the beginnings of the pleasure garden began. The gazebo then became a place for outdoor living. As the grandeur of the houses increased so did gazebos. Some were

The roof of this gazebo is lead covered with scalloped eaves beneath. The sides are made of wood trellis painted black. Within is a gravestone.

J. Liddon Pennock, Jr., is a past president of the Pennsylvania Horticultural Society and is also a member of the Advisory Board of Longwood Gardens and the Harvey Ladew Topiary Gardens in Monkton, Maryland, a board member of the Morris Arboretum, and a lover of gazebos. He lives and gardens at his home, Meadowbrook Farm.

The gazebo at the end of the swimming pool serves as a bath house. The facade matches the house. The copper roof has turned a lovely shade of green.

included as a feature in the areas directly surrounding the house, others were placed at a distance. Guests would stroll out and stop to view the estate from within. The diverse shapes and sizes of these buildings invited many activities including dining, conversing, contemplating nature and children's play.

Today gazebos make a significant statement in the landscape. They play an exceedingly important role in establishing a furnished appearance to the garden. If the proportions of the garden are sufficient, the number of paths can increase, providing additional locations for other features such as a fountain, a bench, a sundial, statue, or just a pedestal. And all of these subordinate features should complement the gazebo.

There are many materials available for building a gazebo. Wood is the simplest to work with and the least expensive. In selecting your material remember that it must blend with the existing walls, fencing, and other buildings. True, there are exceptions. An imaginatively created canvas tentlike structure could provide material for a gazebo. We often erect a canvas roof with a pipe frame over an open terrace, patio, or deck.

The color of these structures should be carefully considered. Where there is a white trim on the house, white paint would be most appropriate. Yet if the buildings are of stone with stained wood doors, window frames, and circled by a natural wood fence then white would not be a good choice.

Although there are now precut and ready-to-assemble gazebos, most when installed look just like what they are—prefab structures. Garden books are filled with photographs of every type of gazebo. Look at them and adapt them to your needs. With imagination and the help of your handyman, you can develop your own gazebo.

Only one of the nine gazebos at Meadowbrook Farm was actually purchased. It was entirely constructed of stone and wrought iron

Six ten-by-ten inch wood columns form a hexagon. Within this setting a pedestal holds a cascading prostrate juniper. The woodwork is painted gray.

during the 19th Century. Purchased in England, it was crated and shipped to Philadelphia then reassembled by a talented stone mason, Pete Marcolina. The other eight gazebos were designed and built on the property, often with the help of an efficient carpenter.

A bath house at the end of a swimming pool was our first gazebo. The facade was toned to match the house. The roof however was copper and in later years finally turned a lovely shade of green. The stone wall which surrounded the gazebo possessed the same flagstone capping found on the terraces and stairs, in turn matching those around the house.

The gazebo that marks the entrance to one of the greenhouses is made of strap iron formed into a metal dome and supported by iron trellis-work panels. This gives the structure the lacy look of a huge bird cage. It provides a framework for hanging baskets which look like feathery green chandeliers swaying gently in the breeze.

A particularly interesting gazebo is made entirely of wood laths. It has a roof of open spaced members that are held up by latticed panels. This connects the two wings at each end with a pair of arbors. The entire structure is only four feet deep and eighteen feet long. Although it is used to keep greenhouse plants during the summer months, it also makes an excellent ending, as well as a skillfully contrived screening barrier. A simple three-tiered drip fountain performs the task of providing a focal point for this little gray trellis fantasy.

Our latest gazebo takes the form of a solid hexagon. It is situated at the end of a 200 foot grass panel edged with brick and low-clipped boxwood hedges flanked on either side by well-maintained perennial borders. The colonnade itself has the appearance of a Stonehenge. It is composed of six ten-by-ten inch-wood columns cut in ten-foot lengths and connected with six four-by-eight-inch cross members. All were precut in the saw mill to the exact dimensional angle. Upon delivery the twelve heavy wood timbers were fastened together with ten penny nails. A perfect six-sided structure was the result.

We then trimmed it with classic egg and dart moulding of pressed plastic. Each of the six upright units were topped by handsome poured concrete pineapples. Each column had to be set in a cement footing. This roofless structure provides a serene setting for a stone pedestal holding a cascading prostrate juniper. The container remains throughout the year. The woodwork is painted a weathered gray.

One of our most distinguished gazebos was made for a garden featured in a Philadelphia Flower Show of the 30s. We fell heir to it after it had dwelled in a neighbor's property. The gazebo stood amongst a remarkable collection of trees some of which were rarely found in the Philadelphia area. When the owner died, it became an important part of our garden. It now rests on an octagonal base of antique brick. Because of the curious pitch of the lead-covered roof, it looks like an oriental pavilion with scalloped eaves. The sides are made of wood trellis painted black. A small window in the rear frames a Hebrew gravestone. The date on this historically important stone is 1805. The deceased gentleman lived in Philadelphia when George Washington was president. This lovely little gazebo poses as the end feature of the main axis of our upper garden and must be approached through a lovely iron gate in a curved brick wall. One is then guided to a simple rectangular yard of pebbles and from there to the little black building. Yellow azaleas abound in this area and in early May when the shrubs are in full bloom, give one the sense of being bathed in captured sunlight. The setting for this is a grove of seventy-five year old towering white pines; pure horticultural drama!

Each gazebo at Meadowbrook Farm has its own special setting not to be seen until one enters the area wherein it is located. Proceeding from one section to the next reminds many of Vita Sackville-West's Sissinghurst which too, is an aggregate of segmented garden areas, one after the other and never actually seen in their entirety. And so in our garden each must be sought out and viewed in its own special setting.

A new gazebo made its debut at the 1987 Flower Show. It is ten-foot high, twelve-foot long and four-foot deep and features three graceful arches in the front with three in the rear. It is reminiscent in style of the great Italian architect, Palladio, whose designs are still used in classic architecture today.

Three graceful arches complement this wood lath gazebo. The style is reminiscent of the Italian architect, Palladio.

Garden Furniture

"Gardens are made to sit in."
Thomas D. Church, 1955

THE TURFED GARDEN BENCH

Rosemary Verey

Compared with other garden features, garden furniture such as chairs, benches, and tables seems to have been neglected by the early gardeners, and it was not until the sixteenth century that outdoor furniture appears on the garden scene. In medieval pictures, the days of the flowery mead, the garden occupants looked as though they were happy sitting on a grassy bank enjoying the sunshine and flowers. Perhaps the ladies' voluminous skirts protected them from the damp grass, but I felt sympathy towards the young men with scant skin-tight pants.

Indoor furniture was simple and utilitarian and the housewife might have carried a wooden bench outside when the sun was shining but the natural place to sit was either on the ground, a low bank or mound and these developed into turf covered benches with wooden or brick sides. These benches are really only an extension of the idea of raised beds. The obvious place to have a turf bench would be against a wall or palisade, protected against the wind and with a ready-made backrest. Not much imagination would be required to do this and it would incorporate a new element into the garden.

By Tudor times when great importance was set upon aromatic plants and herbs, camomile-covered seats became the fashion. These are easy to copy in or beside your own herb garden, using a simple framework of bricks or planks infilled with soil. The two important points to remember are to make the sides strong and solid so when heavy people sit down these do not bow outwards, and then you must firm the infilling soil down extremely well before doing any planting, otherwise as it settles it will sink and become an uncomfortable seat.

A seat like this can be made much more attractive if it has some sort of arch or bower over it. A simple form of arch as would have been used in the sixteenth century could be constructed over the seat, strong enough to support honeysuckle and climbing roses, eglantine, a vine or wild clematis. The simplest method to achieve this is to make three panels with crossed slats* and two by two inch (5 x 5 cm) wood. The panel for the back should be about four feet (1.25 m) wide and six and a half foot (2 m) high, the side panels at each side slightly narrower. Construct a triangular pediment and roof it in with curving slats. This will be strong enough to last for years.

As this is the kind of bench you will use mostly in the summer, it is a practical thought to have climbers over it. Choose those which need hard pruning each winter, then if repairs are needed to the trellis it can easily be done without hurting the climbers after these have been pruned. Golden hop, *Humulus lupulus* 'Aureus', makes a tremendous amount of growth each summer and has the prettiest of hops by the autumn. *Vitis vinifera* 'Brandt' or *V. coignetiae purpurea* both have attractive leaves and also bunches of grapes, decorative rather than useful. Treat the hop as herbaceous, cutting it to ground level in the winter and prune the vines hard. You could also use annual climbers such as sweet peas, *Cobaea scandens, Asarina (Maurandya) erubescens,* and *Tropaeolum peregrinum.* I believe that ivies would be too heavy and would need a more permanent fixture.

John Worlidge, that most practical writer in the period after the restoration of Charles II in 1660, has useful thoughts. "For cool recesses in the hottest times, it hath been useful to erect or frame arbours with poles or rods." However, he does not altogether recommend them as the seats are "apt to be moist." And, "if the weather invite you to sit in the air, a seat under the shade of some platanus, Lin-tree is much more pleasant than to be hood-winked in an arbour." You may choose a seat which can be moved about the garden, "This seat may be made close behind, that being set with the back to the wind, will be both warm and dry." A niche in the wall is a good place "at the ends of your walks are the most proper places for such seats, that whilst you sit in them you have the view of your garden."

*Many Home and Garden centers now carry pre-finished lattice work in 4 x 8 foot sections ready to be stained or painted.

Rosemary Verey is the well-known co-editor of The Englishwoman's Garden *and* The Englishman's Garden *and the bestselling* The Scented Garden. *Her gardens at Barnsley House in Gloucestershire are featured frequently in American and British gardening magazines and are visited every summer by gardeners from around the world. She has close ties with the Brooklyn Botanic Garden and designed the herb garden at the Montreal Floralies in Canada.*

Worlidge's thoughts are the forerunners of the eighteenth-century temples, for he describes and recommends semicircular seats with a cupola, a wall behind and three or four columns in front. As for color, they may be "painted with a white color in Oyl, or as best pleases your fancy."

In the nineteenth century garden seats become important, for all the writers have something to say about them. Jane Loudon remarks that seats for a garden or pleasure ground are usually bought ready-made. A pleasant idea is to have one which is movable, to wheel about from one place to another. On a terrace, seats should be erected at each end, made of wood and of a "somewhat massive design." A novel suggestion was to paint the seat white and whilst the paint was still tacky to strew very fine sand on to it "which will make it a very good imitation of stone." Probably not very practical as I believe this would gather the dirt quite quickly. True to Victorian romantic thought, Mrs. Loudon wrote, "Agreeable variety may be occasionally produced by having the stump of an old tree formed into a seat and twining ivy and creeping flowers round it."

Regarding the question of what color seats should be—natural wood, stained, or painted—Charles M'Intosh decreed in 1853 that "All garden seats except the rustic, should be painted stone-color, as harmonizing better with vegetation than any other color, and of all colors the most unfit for the purpose is green." Shirley Hibberd in 1870 wrote, "Wood in its natural color is much to be preferred to painted wood. The feet of all chairs should be touched with hot pitch sufficient to make the whole impervious to moisture."

As one would expect Gertrude Jekyll has useful comments. She tells us that teak and oak are the best materials to use, I wonder whether she knew about the wood iroko, imported today, which is not so durable as teak but takes on a very attractive silver hue as it weathers. She comments, "Green is a doubtful color, as it is likely to quarrel with the varied natural greens which are near it. White is safe, but looks rather staring during the seasons when there is no brilliant color in the garden to relieve it." In my opinion a very deep green, so dark you have to look twice before you realize it is not black, is very chic, especially for tubs. It is a safe color to use in almost all circumstances. I first saw this in a garden of great taste in the south of France.

Colors, of course, look different and have a different impact according to their surroundings. In warm sunshine the blue-green used by Lawrence Johnston in his French garden near the Mediterranean coast looks smart and right, and it can look good in many English gardens although I believe a warmer color should be used where the natural color of the stone is dark and cold. The Lawrence Johnston blue-green came from the glaze of that color in china pots which were in his French garden. A few years ago, walking in this garden one could see fragments of the toolshed door and other pieces which bore traces of this color. He deliberately used it to blend with the foliage. You may visit Hidcote in Gloucestershire and see the same color on the tubs and old stable doors (now part of the shop) and then go to nearby Snowshill where the woodwork is painted "Wade Blue." (Although the original "Wade Blue" had lead in it, now it is no longer an ingredient and the color is subtly different.) Jim Marshall of the National Trust tells me that Lawrence Johnston used white, matt black, and dark green for the Hidcote garden furniture. Who, one asks, is the arbiter of taste?

Beautiful seats have been made of stone, one sees these in photographs of Edwardian gardens where they were added more for ornament than use, making part of a grand stone terrace or stairway. Probably they were not sat on for too long except in the height of summer, for they were cold and uncomfortable. However, they are ideal for a pause and give solidity to a garden. Remarkably good reproductions are made by both Chilstone of Newport Pagnell and by Haddonstone of East Haddon in Northamptonshire. Several years ago, we bought two and these are now indistinguishable from real stone. My favorite is slightly curved and one of the lions which form the supports has a covering of moss over his feet as though it were a shawl.

There are pretty wrought iron seats in eighteenth-century garden illustrations and then in the next century when cast iron became the fashion, seats, tables, urns, and all sorts were turned out in quantity for the Victorian garden. The use of cast iron opened the way to making seats and tables with many decorative patterns and these you can see in gardens today. They always add a touch of style. Maybe they are hard to sit on and unless kept well painted. Charles

M'Intosh's remark of 1853 is as true today as it was then: "The only objection urged against them is oxidation, which is apt to spoil ladies' dresses." Even so, I would rather have them made of the real thing than modern plastic which, by pretending to be something it is not, looks ugly.

So for the garden maker today what are the choices? There are good reproductions made of the nineteenth-century iron furniture, which should be durable and heavy in weight but not in style. I believe there is scope for an enterprising production of metal garden furniture, as long as it is practical, comfortable, and beautiful. Stone benches are being reproduced, and in the garden they are admirable for a focal point where the sitter will not linger too long, and in order to get them naturally weathered as fast as possible, they should be under a tree where they will get dripped on regularly. As for wooden seats, these range in quality and price from craftsman-made to cheap substitutes which will quickly deteriorate. If you make a visit to Hidcote and nearby Snowshill, the home of the late Charles Wade, to note the two different blues used on the woodwork, you could also notice the very attractive "Conversation Seat" made recently by Charles Verey especially for Snowshill. It is comfortable, has flowing lines and as its name implies is suitably shaped for talking.

Lutyens Bench, created by Sir Edwin Lutyens in collaboration with Gertrude Jekyll. Its elegant style dates back to early 1900s.

Photo by Elvin McDonald

Garden Furnishings

Alice Morse Earle

(This chapter is condensed from the book, Old Time Gardens, *written by Miss Earle in 1901.)*

Quaint old books of garden designers show us that much more was contained in a garden two centuries ago, than now [1901]; it had many more adjuncts, more furnishings; a very full list of them has been given by Batty Langley in his *New Principles of Gardening*, etc., 1728. Some seem amusing—as haystacks and woodpiles, which he terms "rural enchantments." Of water adornments there were to be purling streams, basins, canals, fountains, cascades, cold baths. There were to be aviaries, hare wattens, pheasant grounds, partridge grounds, dove cotes, beehives, deer paddocks, sheep walks, cow pastures, and "manazeries" (menageries?); physic gardens, orchards, bowling-greens, hop gardens, orangeries, melon grounds, vineyards, parterres, fruit yards, nurseries, sundials, obelisks, statues, cabinets, etc. decorating the garden walks. There were to be land gradings of mounts, winding valleys, dales, terraces, slopes, borders, open plains, labyrinths, wildernesses, "serpentine meanders," "rude-coppices," precipices, ampitheatres. His "serpentine meanders" had large opening spaces at proper distances, in one of which might be placed a small fruit garden, a "cone of evergreens," or a "Paradice-Stocks,"—about which later mysterious garden adornment I think we must be content to remain in ignorance, since he certainly has given us ample variety to choose from without it.

Other "landscapists" placed in their gardens old ruins, misshapen rocks, and even dead trees, in order to look "natural."

In 1608 Henry Ballard brought out *The Gardener's Labyrinth*—a pretty good book, shut away from the most of us by being printed in black letter*. He says:—

"The framing of sundry herbs delectable, with waies and allies artfully devised is an upright herbar."

Herbars, or arbors, were of two kinds: an upright arbor, which was merely a covered lean-to attached to a fence or wall; and a winding or "arch-arbor" standing alone. He names "arch-herbs," which are simply climbing vines to set "winding in arch-manner on withie poles." "Walker and sitters thereunder" are thereby comfortable protected from the heat of the sun. These upright arbors were in high favor; Ballard says they offered "fragrant savours, delectable sights and sharpening of the memory."

Tree arbors were in use in Elizabethan times, platforms built in the branches of large trees. Parkinson called one that would hold fifty men, "the goodliest spectacle that ever his eyes beheld." A distinction was made between arbors and bowers. The arbor might be round or square, and was domed over the top; while the long arched way was a bower. In our Southern states that special use of the word bower is still universal, especially in the term Rose bowers. A quaint and universal furnishing of old Southern gardens were the trellises known as garden lyres. Shown in this chapter, from Waterford, Virginia, is one bearing little foliage. . . in order to show what a really good vine support they were. Garden lyres and Rose bowers are rotting on the ground in old Virginia gardens, and I fear they will never be replaced.

The word pergola was seldom heard here a century ago, save as used by the few who had traveled; but pergolas were to be found in many an old American garden. An ancient oval pergola still stands at Arlington, that beautiful spot which was once the home of the Virginia Lees, and is now the home of the honored dead of our Civil War. This old pergola has remained unharmed through fierce conflict, and is wreathed each spring with the verdure of vines of many kinds. It is twenty feet wide between the pillars, and forms an oval one hundred feet

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Alice Morse Earle was born in Worcester, Massachusetts in 1853. The author of many books on life in colonial America, she was a member of Colonial Dames of America but is best known for her two books on gardens and gardening: Old Time Gardens *first published in 1901 and* Sun Dials and Roses of Yesterday *from 1903.*

Quaint and universal furnishings of old Southern gardens were trellises known as garden lyres. This one is supporting a vine.

*Black letter was an antique typeface characterized by a black face, angular outlines, and almost impossible to read with any speed.

"Furnished with whatever may make the place agreeable, melancholy, and country-like"
—Forest Trees, *John Evelyn, 1670.*

long and seventy feet wide, and when in full greenery is a lovely thing. It was called—indeed it is still termed in the South—a "green gallery," a word and thing of mediaeval days.

Little sisters of the pergola are the *charmilles,* or bosquets, arches of growing trees, whose interlaced boughs have no supports of wood as have the pergolas. When these arches are carefully trained and pruned, and the ground underneath is laid with turf or gravel, they form a delightful shady walk.

Charming covered ways can be easily made by polling and training plum or willow trees. Arches are far too rare in American gardens. The few we have are generally old ones. Cedar was once an old choice for hedges and arches. It easily winter-kills at the base, and that is ample reason for its rejection and disuse.

The many garden seats of the old English garden were perhaps its chief feature in distinction from American garden furnishing today. In a letter written from Kenilworth in 1575 the writer told of garden seats where he sat in the heat of summer, "feeling the pleasant whisking wynde." I have walked through many a large modern garden in the summer heat, and longed in vain for a shaded seat from which to regard for a few moments the garden treasures and feel the whisking wind, and would gladly have made use of the temporary presence of a wheelbarrow.

Grottoes, arbors, and summer-houses were all of importance in those days, when in our latitude and climate men had not thought to build piazzas surrounding the house and shadowing all the ground floor rooms. We are beginning to think anew of the value of sunlight in the parlors and dining rooms of our summer homes, which for the past thirty or forty years have been so darkened by our wide piazzas. Now we have fewer piazzas and more peristyles, and soon we shall have summer-houses and garden houses also.

There are preserved in the South, in spite of war and earthquake, a number of fine examples of old wrought-iron garden gates. King William of England introduced these artistic gates into England, and they were the height of garden fashion. Among them were the beautiful gates still at Hampton Court, and those of Bulwich, Northamptonshire. They were called *clairvoyees* on account of the uninterrupted view they permitted to those without and within the walls. These were often painted blue; portions were gilded.

Fountains were seen usually in handsome gardens in the South; simple water jets falling in a handsome basin of marble or stone. Statuary of marble or lead was never common in old American gardens, though pretentious gardens had examples. Usually our statues are of marble, sometimes a Japanese bronze is seen.

In the old black letter *Gardener's Labyrinth,* a very full description is given of old modes of watering a garden. There was a primitive and very limited system of irrigation, the water being raised by "well-swipes;" there were very handy puncheons, or tubs on wheels, which could be trundled down the garden walk. There was also a formidable "Great Squirt of Tin," which was said to take "mighty strength" to handle, and which looked like a small cannon; with it was an ingenious bent tube of tin by which the water could be thrown in "great droppes" like a fountain. The author says of ordinary means of garden watering:—

"The common Watring Pot with us hath a narrow Neck, a Big Belly, Somewhat large Bottome, and full of little holes with a proper hole forced in the head to take in the water; which filled full and the Thumbe laid on the hole to keep in the aire may in such wise be carried in handsome Manner."

Beehives were once found in every garden; beeskeps they were called when made of straw. Picturesque and homely were the old straw beehives, and still are they used in England. They served as a conventional emblem of industry. They were made of welts or ropes of twisted straw, as were the heavy winnowing skeps once used for winnowing grain. In Maine, in a few out-of-the-way communities, ancient men still winnow grain with these skeps. I saw a man last autumn, a giant in stature, standing in a dull light on the crown of a hill winnowing wheat in one of these great skeps with an indescribably free and noble gesture. He was a classic, a relic of Homer's age, no longer a farmer, but a husbandman.

When I see a row of [beehives] set under the trees, or in a hive-shelter, they seem to tell of

olden days. The very bees flying in and out seem steady-going, respectable old fellows. Such hives have a cosy look, with rows of Hollyhocks behind them, and hundreds of spires of Larkspur for these old bees to bury their heads in.

The sadly picturesque old superstition of "telling the bees" of a death in a family and hanging a bit of black cloth on the hives as a mourning-weed still is observed in some country communities. Whittier's poem on the subject is wonderfully "countrified" in atmosphere, using the word chore-girl, so seldom heard even in familiar speech today and never found in verse elsewhere than in this rustic poem.

A pretty and appropriate garden furnishing was the dove cote. The possession of a dove cote in England, and the rearing of pigeons, was free only to lords of the manor and noblemen. When the colonists came to America, many of them had never been permitted to keep pigeons. In Scotland persistent attempts at pigeon-raising by folks of humble station might be punished by death. The settlers must have reveled in the freedom of the new land, as well as in the plenty of pigeons, both wild and domestic. In old England the dove cote was often built close to the kitchen door, that squab and pigeon might be near the hand of the cook. Dove cotes in America were often simple boxes or houses raised on stout posts. Occasionally might be seen a fine brick dove cote like the one still standing at Shirley-on-the-James, in Virginia, which is shaped without and within like several famous old dove cotes in England, among them the one at Athelhampton Hall, Dorchester. [This] dove cote has within a revolving ladder hung from a central post while the Virginia squab catcher uses an ordinary ladder. The shelves for the birds to rest upon and the square recesses for the nests made by the ingenious placing of the bricks are alike in both cotes.** ✿

Beehives were once found in every garden. They were often set up in a row near flowers for the bees to bury their heads in.

**Perhaps this feeling towards pigeons explains the respect they enjoy in our great American cities.

A Look at Fences in the Garden

Edward Lindemann

Fences are a wonderful invention. They keep the neighbor's dog where it belongs and the children from where they don't belong. Fences hide the trash cans and mark the boundaries of our domains providing us with a sense of satisfaction in ownership.

Any element in a landscape design, organic or architectural, should have a purpose. Fences are no exception. They provide security, privacy, visual distraction and create illusions. Fences provide support and act as backdrops for plants. The appearance of the fence is greatly enhanced by accessories—gates, locks, latches, footing and finials.

Once you have decided that a fence is the solution to your problem take time to consider: is the use of a fence permitted by your local zoning regulation? What purpose is the fence to fulfill? Can it be found as a ready-made stock item or must it be custom built? If both choices are available, check prices. I have found that price varies with the type of fencing and current lumber costs. Sometimes it is less expensive to purchase ready-made panels than to buy the lumber and construct the fence yourself. Consult a professional if you have questions regarding the type and quality of building materials, types of footings and foundations, paints and stains.

Most of the fences erected today are either wood, metal or a combination of both. To me, wooden fences, while requiring more maintenance, seem to fit better in a home garden. Most modern metal fences tend to have a commercial look, but there are some aluminum fences made to resemble wrought or cast iron of

All Photos by Author

An easy facelift for the standard chain-link fence is to cover it with bamboo reeding. Here six-foot-high rolls of bamboo reeding have been wired to the existing chain-link fence. The result is a natural backdrop for the shrub collection and an added degree of privacy.

A custom designed lattice fence acts as a visual rather than physical barrier between the road and parking court. The fence allows movement of light and air and at the same time acts as a strong architectural element in the overall design. During the growing season the fence also supports a collection of clematis.

years gone by. These modern imitations work well in the landscape and blend especially well with masonry structures.

Regardless of the size of the garden, be aware of how a proposed fence will fit in with the existing design. The use of more than one fence style in a single garden can be an interesting design element. It helps to make a sketch of the fence, labeling all of the items needed for construction. With privacy fences, the height is often crucial. Setting up a couple of posts and running a string or ribbon across the top will give you an idea of what the fence will block from view. This mock-up will allow you to determine if the fence should be higher or lower. Adjustment at this point is much easier than when the fence is finished.

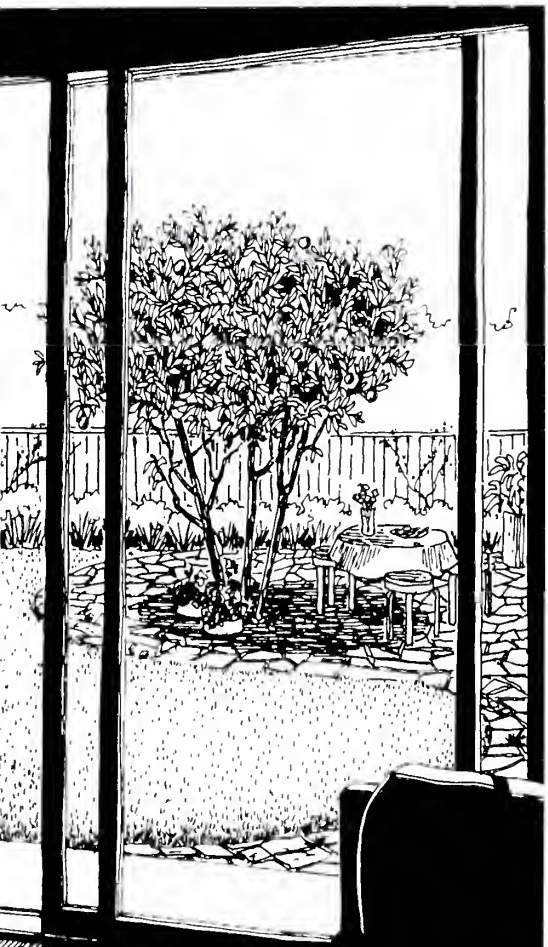
If a gate is to be incorporated, I have found that it is easier to hang the gate when you come to the location and then proceed with the rest of the fencing than to try to squeeze the gate between two existing sections of fence. Be sure to determine beforehand which way the gate is to open and the width that is needed. Nothing is more frustrating than to spend an entire weekend building a fence around the vegetable garden and then to discover that neither the wheelbarrow nor the rototiller fit through the gate.

Fences in the landscape function the same as walls in planning interior spaces. They can simply exist or they can take on personalities and become interesting assets to the overall design. Carefully consider the possible textures, shapes and colors of the materials that are available. Try working out different combinations to achieve greater interest, or in some cases to deflect attention. Is the fence to be a feature or is it to recede and allow other elements to predominate? Fences in the landscape cannot be ignored. Their use can be subtle or flamboyant; that is the designer's decision. Success is achieved when the end result fulfills the need as well as providing an aesthetic overall design.

Edward L. Lindemann is the designer of the world's largest indoor horticultural display, the Philadelphia Flower Show. He is responsible for arranging a seven-acre floor plan for over 100 major exhibits and designing the aesthetic features of the show.

Plants As Garden Ornaments

Familiar materials, freshly used, create A New Experience in the Garden



When trees have an open structure, three placed in one planting hole with the trunks leaning away from the center will grow to a handsome architectural clump in a short time.

Maggie Baylis

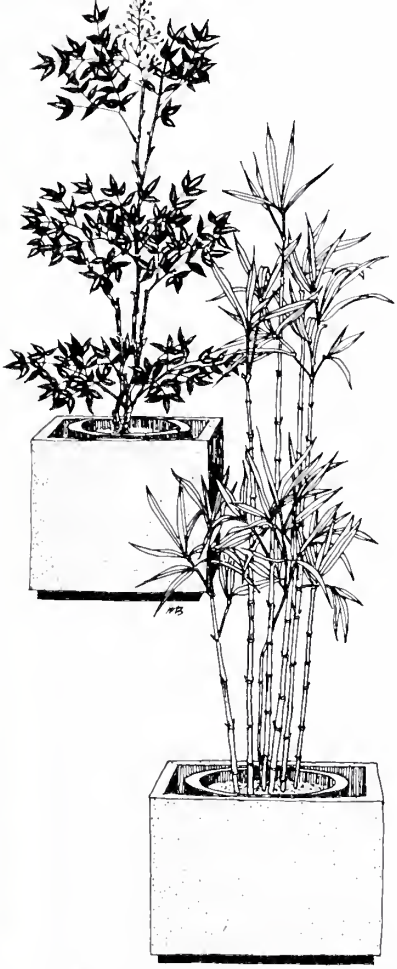
And there you are one day, come spring, after a winter of nose-in-the-nursery-catalogs, standing in the middle of your outdoor "room". You're wondering if there's any kind of place for one of the intriguing small trees you listed. Perhaps some of these sketch ideas will give you reason to narrow down your list to a tempting few which may have more than the usual quality of a "show" performer.

It could be one particular tree family which titilates your interest, an immigrant from another part of the globe whose living habits may just match those of your garden, or it could be something nostalgic, as familiar as your Mother's old catalpa.

Just because you've seen one specimen, or will read about something here, don't go out and buy the first one you see. Look into its resumé fully. Visit your local arboretum or botanical garden. There may be a new variety with even more potential to be a featured plant, a tree with pizzaz, a tree with sculptural character.

If it still charms you (and you can disarm your budget without pain), then set to work deciding where it will become a focal point. Be bold and think in terms of where you'd like a sculpture; develop a welcome visual interruption. (As the Japanese plot it, one must not see the whole at once, but should enjoy each fragment as a separate design piece.)

Maggie Baylis has a background of architecture, advertising, and graphics; associate of her late husband, Landscape Architect Douglas Baylis for 20 years. Author and illustrator of three books, two on houseplants. She is an active volunteer with the Strybing Arboretum Society in Golden Gate Park.



Drawings by Maggie Bayles

Two stately ladies that might grace balconies or terraces are golden cane bamboo (Phyllostachys aurea) *and heavenly bamboo* (Nandina domestica). *Nandina has canelike stems and fine-textured foliage.*

There are unlimited ways to make a setting for a special plant, just as there are limitless ways to decide where to stage that setting. The tried and true use of a long stick or mop handle with bright ribbon at the top, to be poked into lawn or at a step's edge or in a flower pot on patio or terrace, gives the designer (and assorted relatives and overzealous friends) opportunity to view the stake from every angle. Will the tree be easily visible from the house and does it have a contrasting background to silhouette its shape? Should it be planted in a container to raise it above the lawn or terrace level? Will it get sun all day, or is there shade from grandparent trees in heat of summer? Will it sit in the lawn or against a house wall, or could a square cutout be made in a paved area? Plants in containers may be moved but once roots are settled in the ground —well, you know. So take plenty of time to make the decision.

Let's start with a very simple example: There's a blank wall space next to the rear door which you really never see. Select an evergreen pear (*Pyrus kawakamii*) with three strong leaders, and plant it against the wall and attach several places, or slide a support behind to fasten the branches. Gather courage and begin right away to shape it with a firm hand. It is destined to be a sculpture in two to three years. In spring's shiny leafing and flowering, in summer's light fruiting and in its skinny-dipping winter tracery you've achieved your first focal point.

A pair of two-foot square wood containers in similar position, holding twin trumpet vines (*Bignonia*, recently reclassified as *Distictis buccinatoria*) will add years of deep red glitz to a pallid painted wall or to shingle siding. Like the pear, trumpet vine needs ties to train on a vertical wall.

I've selected my favorite sculptural plants because although some are old-shoe friends, they're all potential showoffs. Most lend themselves to skinning up or shaping. They promise interesting form and texture; they may have striking leaf pattern and color. Some will play games with shadows. They have personality and will produce conversation and admiration. However, as with any outstanding art form, some may get thumbs down because of stubborn spines or outrageous habits.

But then, who said it was easy?

Focal points can be put to work too. One large multi-cane black stem bamboo (*Phyllostachys nigra*) double potted into a glazed Chinese pot and set on a condo's balcony will cancel a view of the nosy neighbor's window; at the same time, surrounded by a groupie arrangement of pots of white petunias it will dazzle the gardener and guests looking through the balcony's glass doors.

In moderate climate, the house linden (*Sparmannia africana*), another multi-stem with huge pale leaves which are translucent and covered, stem and leaf, with fuzz, is a likely substitute. It gives forth clusters of foamy yellow-tinged white bloom in early summer.

Either will enhance a pristine lawn area, being sun lovers, by construction of a small island, perhaps four feet by four feet, on the grass of bricks or tiles. These would be held in

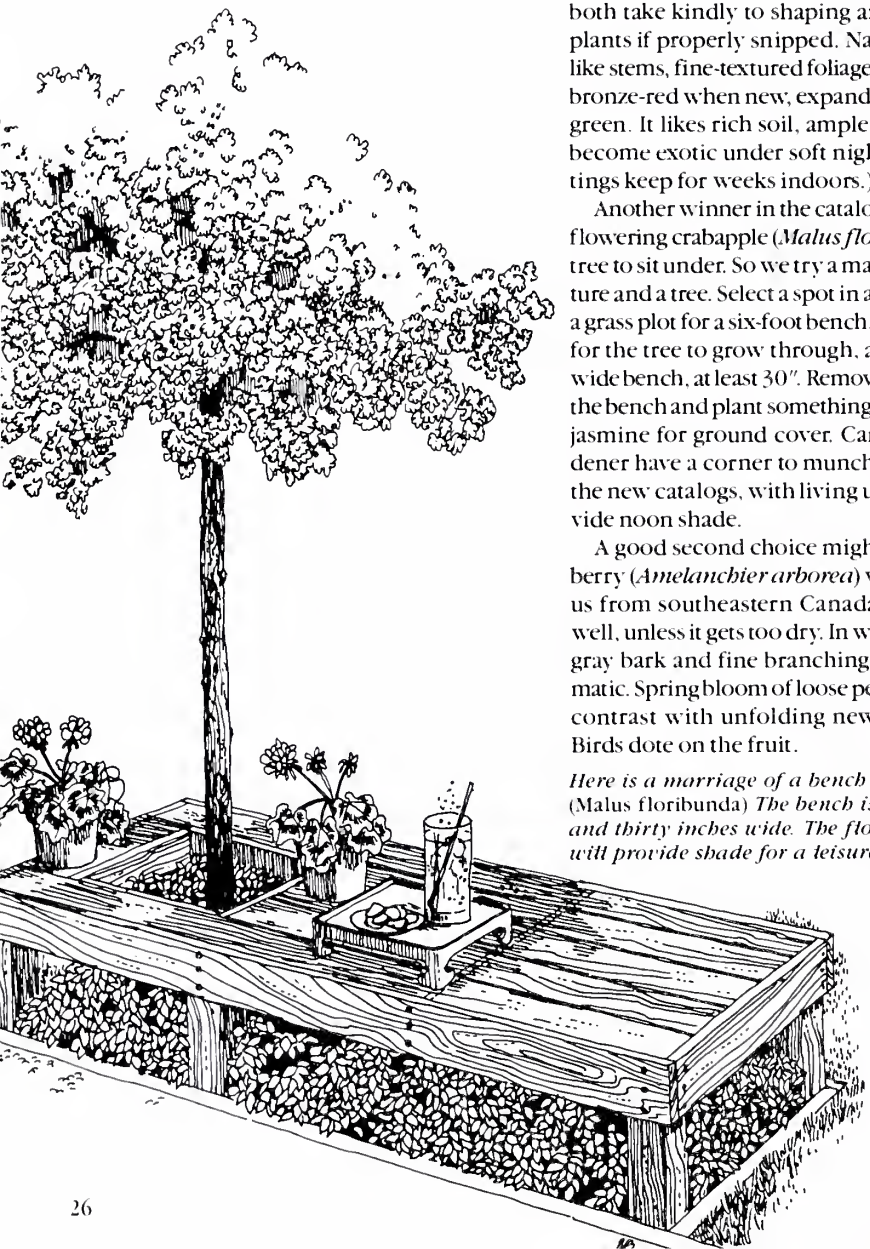
place by a staked border of cypress or redwood. To prevent the grass from creeping through, line the area with black sheet plastic and put down a light sand base. When it's laid, sweep sand into the cracks. Then be bold, add a weatherproof sculpture and you have a dramatic eye-catcher.

If these plants must be garaged for winter, the island quickly becomes a winter birdfeeder station, or a stage set for the outdoor Christmas tree. It could also be the base for three or five large cylindrical flue tiles of varied heights. Each would hold a six- or eight-inch clay pot at the top massed with prime daffodil and tulip bulbs for riotous early bloom.

Two stately ladies who might grace small balconies or terraces are actually hardy container plants: Golden cane bamboo (*Phyllostachys aurea*) and heavenly bamboo (*Nandina domestica*)—unrelated, but one those confusions which occur in using common names. They both take kindly to shaping and become new plants if properly snipped. Nandina has cane-like stems, fine-textured foliage which is pink to bronze-red when new, expanding later to a soft green. It likes rich soil, ample water, and both become exotic under soft night lighting. (Cuttings keep for weeks indoors.)

Another winner in the catalogs is the glorious flowering crabapple (*Malus floribunda*), a neat tree to sit under. So we try a marriage of a structure and a tree. Select a spot in a sunny corner of a grass plot for a six-foot bench, open at one end for the tree to grow through, and the rest for a wide bench, at least 30". Remove the grass under the bench and plant something fragrant like star jasmine for ground cover. Carpenter and gardener have a corner to munch lunch and scan the new catalogs, with living umbrellas to provide noon shade.

A good second choice might be the serviceberry (*Amelanchier arborea*) which traveled to us from southeastern Canada and does very well, unless it gets too dry. In winter the smooth gray bark and fine branching pattern are dramatic. Spring bloom of loose pendulous clusters contrast with unfolding new bronze leaves. Birds dote on the fruit.



Here is a marriage of a bench and a tree (Malus floribunda) *The bench is six feet long and thirty inches wide. The flowering crab will provide shade for a leisurely lunch.*

Zucchini makes a handsome terrace or patio plant for a few months. The secret is to keep it portable to follow the sun.

For the anti-plastic chair purists, a bench made between two wood planters is a basic straightforward structure. Contrasting the clean straight lines could be achieved by planting abundant fountain grass (*Pennisetum setaceum*) which will crest at about four feet with graceful two-foot leaves. Flower spikes are a copper or rose color, making striking dried arrangements. This perennial likes lots of sun and is drought resistant. It will go dormant in winter. Blue fescue (*Festuca glauca*) planted around the edge of the containers, grown in tufts, should be clipped after flowering.

Eighteen to twenty-four inch square wood slat bases in lawn or groundcover areas will let you move tree-form camellias and azaleas until they tell you the location is to their liking. Flowering trained specimens are available at quality nurseries catering to weddings. The plants have been pruned and shaped over a long period to a sculptured ball shape, with center stake for support. They're moderate climate show pieces and need to return to the greenhouse or house over winter. Containers which flatter are white ceramic or wood decorator boxes lacquered high gloss white. Don't expect a single plant to be effective: break the piggybank and go for three.

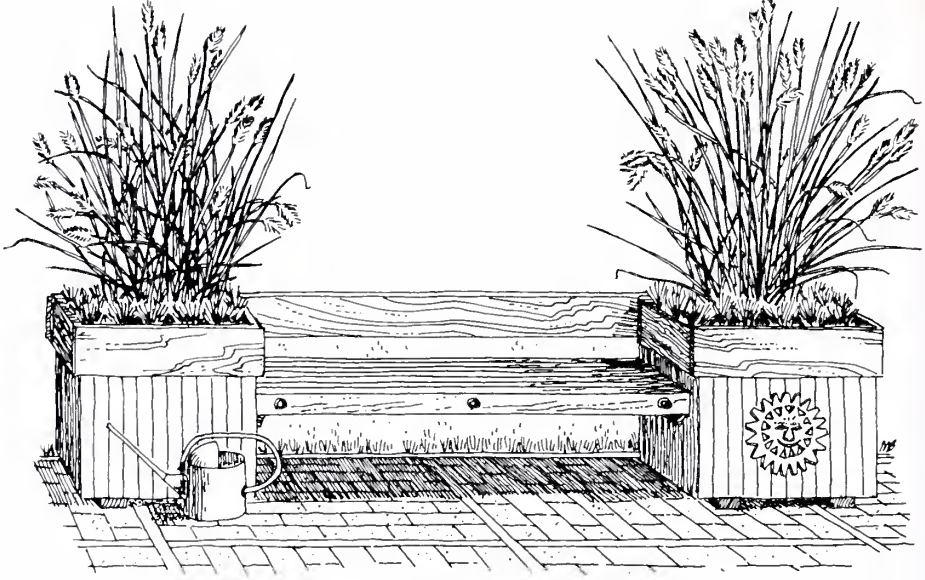
This is a good place to sneak in a renegade: zucchini! Good for a couple of months on a terrace, this broadleaf beauty will make a handsome sculpture on a patio and can be mysteriously unidentified (that is, until someone recognizes the yellow flowering). You can start it from seed or pick up a four-inch bedding plant. The secret is to make it portable to follow the sun. Rhubarb is another lowly with grand leaf pretentions.

Three contenders for an important spot on a terrace or patio because of their dramatic huge leaves are really quite different customers. The classic Bear's Breech (*Acanthus mollis*), an elegant favorite of the ancients as a decorative motif, has shiny deep sea green leaves, with deeply cut lobes, to two feet long. It has imposing spikes of tubular white/lilac/rose flowers. It likes moist shade; bait is a must to protect against embroidery by snails and slugs—they're bears for acanthus.

Rice paper plant (*Tetrapanax papyriferus*) is another bold statement. Silhouetted against a wall or screen, it is compatible with most house types. It's another multi-stem, fast growing, with leaf clusters at ends of long stems. Big branched clusters of creamy white flowers on tan furry stems show in December. Midday sun can scald in a hot summer; foliage will also suffer in cold below 22° F.

Gunnera is an oddball perennial (hardy to Zone 7) with awesome huge deep-veined lobed leaves and stiff stalks covered with prickles. Give this space and it will never be forgotten. Part shade and much moisture are needed in summer and in drying winds. *Gunnera chilensis* is

Gunnera chilensis *has huge deep-veined lobed leaves on stiff stalks. It makes a handsome container plant which needs part shade and lots of moisture.*



A bench between two wood planters is a basic straightforward structure. Fountain grass (Pennisetum setaceum) *provides a soft contrast. Blue fescue* (Festuca glauca) *grows in tufts at the base.*

most easily found. Blossoms may appear in the shape of corn cobs, close to the roots.

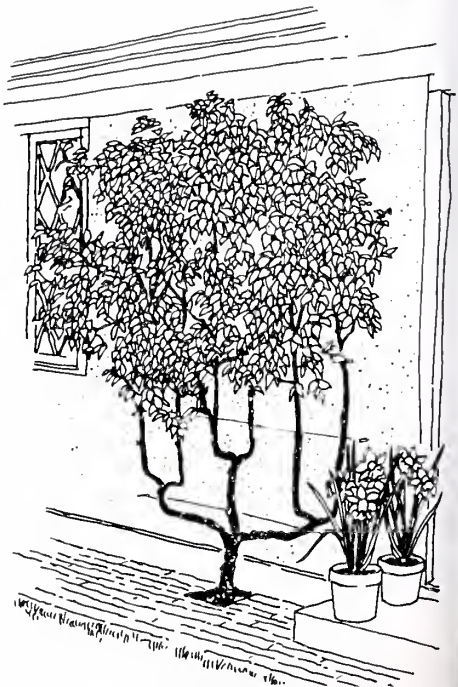
How does your front door greet guests? A handsome container or tub potted up with a sculptural plant and stationed to one side of the door sets the scene as guests walk toward the entrance. Two curtain raisers are *Fatshedera lizei* (hybrid of *Fatsia japonica* and *Hedera helix*) and *Fatsia japonica*, a tropical evergreen with commanding presence. Fatshedera shows characteristics of both parents, has highly polished six inches to eight inches ivylike leaves. It will take temperatures down to 15 °F, needs a generous waterer. Pinching back tips will hold it to an acceptable size. *Fatsia* is lush and tropical, with clusters of white flowers which become small shiny black (inedible) fruit. It has a boldness, particularly the cultivar 'Variegata' whose leaves have a creamy-white outline, adding to the form's visibility.

These theatrical plants demand architectural containers so scout for strong shapes and size. Also, when the urge strikes, surround the base with small pots of color, particularly for greeting guests.

Another contender for porch landings in milder climates is the classic jade plant (*Crassula argentea*), with stout trunk, sturdy limbs with thick fleshy succulent pads for leaves and delicate clusters of pink star-shaped flowers from November to April. A spill of carefully chosen stones and small pots of succulents state a friendly welcome. Incidentally, these actors located at the head of a short flight of garden steps become Take Care signs. P.S. *Crassula* collapses at first freeze.

Then there are the porcupines of the plant world, bristling with spike leaves, but so handsome in their coloration that they must be included. Yucca (*Yucca glauca*) has tough

Pyrus kawakamii *is a good candidate for espalier. Begin to shape it right away and it will be a sculpture within two or three years.*



sword-shaped leaves which dictate that the plant be kept away from walks or tight spaces. There are numerous species which grow all over the country and are surprisingly hardy. This particular one can take any zone, Montana to New Mexico. Shop carefully for one which adds real drama, and has several strong trunks.

New Zealand flax (*Phormium tenax*) an evergreen perennial, is not for the average city garden as it needs space. Even though nursery plants seem modest, it can develop leaves nine feet long. The coloration ranges from purple, red, bronze; 'Variegatum' has stripes of yellow.

Agave is a giant succulent with large clumps of fleshy strap leaves. *Agave americana,* the century plant, is too huge to play with. Try *Agave attenuata* which makes clumps up to five feet across. Greenish yellow flowers are dense on arching spikes. It's one plant which will look great near a swimming pool.

Among the small interesting and familiar trees, I'd have to include citrus for size and shape—a lemon or lime or calamondin sour-acid orange. The wonderful fragrance of blossoms, particularly in early evening plus the vivid fruit color and the shapes which can be manipulated to sculptural advantage make them prime accessories for paved terraces.

Also high on the list would be the pink star magnolia (*Magnolia stellata 'Rosea'*) which is a jewel among other scene stealers. It is deciduous, and multi-branched to produce lacy patterns of shadow in winter's sun. Star magnolia sets forth very early waxy flowers with narrow strap-shaped petals, and with abandon, I might add. The buds are pink, flowers blush pink fading to white. Consider a focal point visible from an important window.

Another structurally impressive small tree is the weeping copper beech (*Fagus sylvatica* 'Purpurea pendula') with an endearing irregular spreading form and weeping branches of purplish leaves. It's an ideal tub plant and can be held to size as long as it is tubbed.

These smaller specimen trees add much to a paved terrace with the removal of a square or rectangle of paving. From an aesthetic viewpoint, one tree may seem weak and lonely in a large open space. However, a matched pair gains admiration, and the classic odd number of three makes the best statement. When trees have open structure, three placed in one planting hole,

Greet guests at the door with sculptural plants in handsome containers. Fatshedera lizei *and* Fatsia japonica *are good candidates.*

with trunks leaning away from the center slightly, they will grow to a handsome architectural clump in a short time.

Recommended reading: The Garden Club of America's "Plants That Merit Attention" (Timber Press, 1984). It could be your best guide to trees for delivering that special sculpture to your garden.

Cylindrical flue tiles of varied height will hold six-or-eight inch clay pots. Masses of spring bulbs raise the curtain in the spring and can be followed by annuals for the summer.

Photography and Garden Ornament

Pamela Harper

Through my business, the Harper Horticultural Slide Library, I offer for publication or lecture purposes some 85,000 35mm slides. It is a varied collection, everything from extreme close-ups to garden scenes, including garden structure (walls, fences, gates, paths, steps), garden features (pools, gazebos, bridges, sundials), and a miscellany of garden ornaments. Over the years a pattern has emerged: the pictures editors pounce on are those that combine what Landscape Architect Jim Van Sweden calls, in the parlance of the computer age, "hardscaping" and "softscaping". The softscaping is the plants, the hardscaping is the non-plant structural and ornamental elements. The two are mutually enhancing. Plants themselves can be the ornament. Trained plants such as topiary and espaliers are neither hardscaping nor softscaping but somewhere in the twilight zone between, not "plants" but "plant material"! They can serve as focal points, just as might a sundial or statue.

Do a bit of "people-watching" in gardens open to visitors. Watch where they gravitate — and not just the photographers. Combinations of plants with structure or ornament have magnetic appeal.

Too much ornamentation makes a garden look "busy", yet we need it in small gardens even more than on large estates. An English garden designer noted that the two most important elements in a garden were vistas and features. Vistas usually take the form of a view of surrounding countryside through some kind of gap, often an avenue of trees. In most of our gardens such gaps reveal only a neighbor's house or a busy street. So we fence our gardens for privacy and become more inward looking. Vistas are replaced by focal points and features that keep the eye within the garden.

Actual examples being more helpful than generalizations, I'm going to describe a few of the pictures repeatedly selected for publication, and those that bring "ooh's" from audiences during slide presentations.

One of the best garden features is a seat. It seems to have a purpose, but this may be illusory: really comfortable seats — those with well-filled cushions on which you can sprawl — are seldom ornamental and best kept near the house. Ornamental seats should suit their surroundings. Thus the delicate tracery of white-painted iron wire calls for formal surroundings — on a terrace, for example. Put a tub of roses alongside and you have a winning picture. In a woodland garden, something more rustic is needed. Really rustic — a plank across logs for example. Seats of intricately interwoven twiggery sometimes termed rustic, being obviously artificial, look better in more structured surroundings. My best selling woodland seat is a couch carved out of a large tree trunk. The seat picture most often published is a simple commercial type bench surrounded by *Sedum* 'Autumn Joy'. In second place comes a home-made lath-type bench against a raised bed, with plants behind encouraged to ramble through onto the seat.

Any garden can be enhanced by ornaments. Woodland gardens can get by without them, but a picture I treasure is of a white-painted wooden owl, axe-carved by a local craftsman, perched in the crotch of a tree.

Pamela Harper is the owner of the Harper Horticultural Slide Library and one of the premier garden and plant photographers of the garden world. Her book, The Story of a Garden, *chronicles the creation and development of a garden by Mrs. Harper and her husband, Patrick, over a period of sixteen years. She is the co-author of* Perennials, How to Select, Grow, and Enjoy.

A drain cover as wall plaque, enhancing the Japanese look given by the lantern.

Beauty is, to some degree, in the eye of the beholder, but garden beauty — occasionally accidental — is usually first in the mind's eye of the creator. Some have a better eye than others. An artist friend bought, from an antique store, a porcelain pot of bulbous shape painted with pinkish-purple flowers of no known kind. Part of its fluted rim was cracked away. I stopped by her house one day in spring, just to say hullo but, thank goodness, carrying a camera. The pot stood on the rosy-brick paving of a patio beneath a standard azalea in a tub. From the umbrella-like head of the azalea, pale-purple petals had cascaded down to surround the pot and strew the paving with color matching the painted flowers. The old cracked pot had become a work of art. In that same garden an old ship's hatch, battered and weather-bleached, formed a platform for a charming vignette. It held an urn and a shallow reflecting bowl that mirrored chrysanthemums growing alongside.

An old, lichened urn of carved stone, entwined with roses, is another favorite picture, but I like even better, because it is of its own place and time, the sculpted racoons placed on a boulder surrounded by ferns. In the same garden a white seal-pup by the same sculptor basks on a rock alongside a pool.

Much available garden ornament insults the eye. Mine, anyway. I would hate to think that displays of ornaments at many a garden center

The "old cracked" pot as ornamental art further enhanced by fallen azalea petals.

Painted bowl holds red and white pelargoniums.

reflect the taste of the buying public. Perhaps they do reflect a gardener's budget! Tasteful ornaments can be very expensive, but they need not be. A large, lichened rock takes a lot of beating. Antique shops, art galleries, and garage sales are likely hunting grounds, then add a pinch of imagination. There is a brewery in my region, and each spring whisky barrels, whole or halves, can be bought for about $7.00. These, stuffed with flowers, make more pleasing ornaments than mass-produced concrete mouldings of saints and madonnas. Which is not to put down concrete. A pair of sculpted concrete doves on a plinth, surrounded by forget-me-nots, made another winning picture. So did a concrete "millstone" with water trickling over its surface. In a friend's garden hangs an attractive ash-gray plaque with a Japanese look. It was made by moulding a mixture of cement and vermiculite over a street drain cover. Drain covers

Sculpted raccoons add whimsy to the garden.

vary from region to region but many are works of art. In the garden of another friend a plaque hung on the fence is framed in ivy, painstakingly trained.

A touch of whimsy does not come amiss in a garden. I liked the sundial with the inscription:

I am a sundial
I make a botch
of something that is done
far better by a watch.

Utilitarian objects can become ornamental features. The Ladew Topiary Garden in Monkton, Maryland, is rich in examples. Stone slab steps leading to a part of the garden called Garden of Eden are engraved with the words:

If you would be happy for a week take a wife
If you would be happy for a month kill your pig
If you would be happy all your life, plant a garden

And to a dog-kennel is affixed a painted board bearing the words:

I love this little house because
it offers after dark
A pause for rest, a rest for paws
A place to moor my bark

Cats make wonderful garden ornaments, if you can persuade them to pose. A clump of catmint strategically placed might do it.

A simple basket holds trained rosemary surrounded by portulaca and becomes a moveable spot of shape and color.

Gaudi's Trees and the Philosophy of Garden Ornament

Allen Lacy

The topic of garden ornamentation and its underlying philosophy somewhat daunts me, both as a professional philosopher and as an amateur gardener. Statues of gods and goddesses, fountains, sundials, stone troughs, English hares made of lead, jockeys, gnomes and toadstools right out of the Brothers Grimm, pink plastic flamingos, mirrored globes of blue glass, little arching bridges leading nowhere, cute little cats of terra cotta—the range of artifacts that become elements in a garden design (or the lack of one) is so vast that the general truths that might unite them all are hard to come by. It strikes me furthermore that the purposes and intentions behind them are quite diverse. The statuary at Versailles is symbol and visible token of political power. A sundial tells time, in a crude way, but it may also tell a lesson about the temporal dimension of every human being's existence, serving to remind us that we are creatures of time, who in time will surely die. I can't quite fathom the meaning of those little arching bridges, except that probably the people who install them in their gardens like them and that surely they have the right.

And I must also here make a confession. Unless I count some windchimes on my deck, my own garden is almost entirely devoid of ornaments. The one bona fide piece of ornamentation is a whimsical terra cotta statue, glazed in pastel pinks and greens and ivory, an abstract sculpture by Betty Bell, an artist friend in Chapel Hill, North Carolina. Called "A Katydid Contemplates the Universe," it lives outside, next to a small pool, three seasons of the year, but spends the winter in our living room. It makes me smile whenever I see it.

As in my mind's eye I recall other gardens than my own and the ornamentation they embody, a single image comes to mind, and it is a strange one in a strange place, a bit of land on a hilltop, intended earlier in this century to be a suburban development but now a public park —Parc Güell in Barcelona, designed by that genius of an architect, Antoni Gaudi. Parc Güell is a garden, with its wisteria-clad cliffs, its cool walks through groves of pines, even its beds of celosias and petunias and its lawns and grassy knolls. But it is also a place where nature and architecture intersect most fascinatingly. Wrought iron, concrete, broken ceramic tiles, and parts of discarded machinery mirror the world of nature and its living forms in a somewhat hallucinatory way. The gates at the entrance to the park suggest palmettos, prehistoric reptiles, the wings of monstrous insects. The gatekeeper's lodge, rusticated stone beneath a steeply swirling roof of terra cotta and ceramic tiles, is a gingerbread house incorporating the forms of snails and of mushrooms—the deadly fly amanita, most likely. Those wisteria vines twine around columns shaped like slanting tree trunks which define a cool, vaulted arcade and which also support a walkway at a higher level. A staircase is split in two by a watercourse inhabited by lizards made of concrete and ceramic tiles.

Here, more than any other place on earth, is the impulse toward ornamentation most forthrightly and freely expressed. But Parc Güell as

Allen Lacy, a professor of philosophy at Stockton State College in New Jersey, contributed a gardening column to The Wall Street Journal *for years and now writes for* The New York Times. *In 1985 he received the citation for garden writing from the American Horticultural Society and has written two books:* Home Ground *and* Farther Afield.

a whole is too large a topic for this space. It is properly the subject of a book—and many have in fact been written. I want instead to call attention to just one element of Gaudí's design for his Parc Güell—his trees. I write from memories of repeated visits to the park with my whole family in 1970 (my young sons were delighted, for Gaudí's enormous powers of imagination made Walt Disney a pedestrian plodder), and from memories of more visits, alone, in 1983, when I was on sabbatical. I have no notes or photographs to rely on. I don't know how many trees there are, but seventeen seems a reasonable guess. I would place their height at around fifteen feet—a scale that puts human beings in their places, without dwarfing them or overawing them. Arranged in an arc around a curve in a wide path of gravel and packed earth, their trunks are constructed of cement and golden-tan stone quarried on the site. They bulge outward at about eye level, suggesting the ancient cork oaks of the Iberian Peninsula. Then they taper inwards, finally flaring out into wide and open goblets, becoming containers for plants—mostly large agaves, whose forms, in this setting, are seen as no less fantastical than the "trees" whose living parts they are.

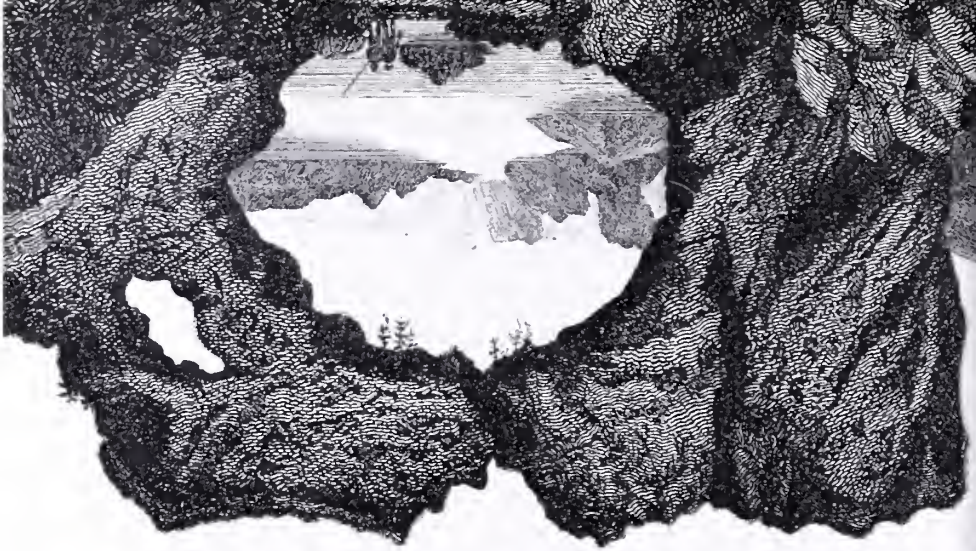
In *As You Like It* Shakespeare spoke of "tongues in trees, books in the running brooks, sermons in stones"—of nature in short, if I have his meaning right, as a system designed to send moral messages to the human race. The hubris and anthropomorphism of this doctrine of our place in nature is now discredited, even if it produced in its time some thrilling poetry—not only Shakespeare, but also Dante and Wordsworth—as well as some terrible stuff. Gaudí's trees, however, are the creations of a human mind, and I think they do have sermons to preach, about gardens and other things as well.

Every garden tempts us to live within an illusion, perhaps even a delusion. That illusion is that it is something natural, not the creation of artifice. We plant oaks or willows, and in time we forget that it is we who have planted them—we our own selves, or some previous inhabitant of our patch of earth. We come to believe that they have grown of their own accord, by their own doing. Gaudí's trees argue unmistakably that they are the product of human artifice. They are artifacts, and as such they illumine the fact that the rest of a garden—its walks through groves of pines, its pleasing grassy knolls—is also a human artifact.

But those trees of concrete and stone in the Parc Güell would be brutal and dehumanizing were they only concrete and stone. Dead, they mimic the forms of nature, real trees. But Gaudí was too witty—and too deeply a Christian mystic as well—to let inorganic materials, mocking organic shapes—have the final say. Though dead, the trees are also in a sense alive, for they are home to living plants. A garden is a place of intersection between the natural and the artificial. It teaches us at once humility and pride in achievement, acceptance of what is the case and willingness to change things as they are.

Here, I suspect, may be one of those elusive general truths mentioned earlier. The plastic flamingo, the concrete gnome, the majestic gods and goddesses, the images of Pan, the bronze lizards, the katydids contemplating the universe—all of these are artifices, but copies of things that live on the earth or that live in the human imagination, itself a product of the earth. They complete a garden, for they remind us what gardens are, not the gifts of nature to deserving human beings but the products of human beings cooperating with the natural order to create utility and delight.

There's one more thing about Gaudí's trees, however, and about garden ornaments in general. I'm not certain when those trees were constructed, but it was sometime between 1900, when work began on Parc Güell, and 1914, when the project was abandoned unfinished, never becoming the center of the group of private homes the architect envisioned. The trees have stayed much the same since they were built, but the gardens of the park have changed as they have matured. Palm trees along the perimeter of an area set aside for grown-ups to sit on benches and watch their children playing ball—trees once tiny are now immense. The grown-ups on the benches perhaps once played ball in Parc Güell, in the days of their own childhood. Garden ornaments, especially those carved from stone or fashioned in strong clay, are fixed points in a changing landscape of both growth and decay. They endure. I am almost tempted to say something that Gaudí, the mystic and the architect, might have said of his own artifacts. They aren't eternal. But they somehow stand for the eternal, something solid and real and unchanging in the midst of the flux of time.



Grottoes

Rosemary Verey

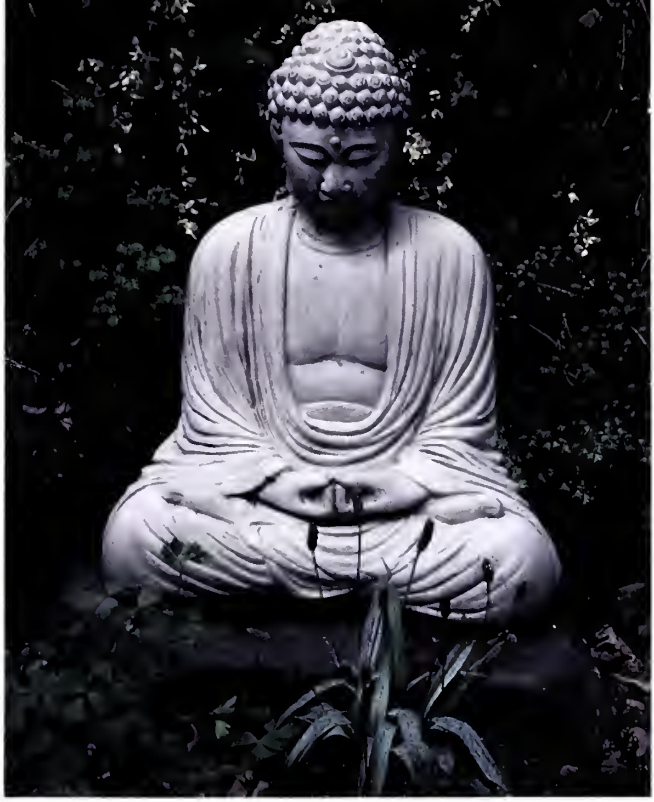
Grottoes go back to the earliest gardens, they were the sacred caves, the homes of the water nymphs. Classical Roman gardens had them and they were important features in Renaissance Italian gardens when water effects such as fountains and hidden sprays were the height of fashion.

In England one of the earliest grottoes was made at Enstone in Oxfordshire by Thomas Bushell—at one time secretary to Francis Bacon—who had a passion for philosophy. His grotto became so famous that even King Charles I visited it in 1643. It faced due south and the effect of running water was multiplied by the use of a mirror which created optical surprises. There were water jokes all about and cocks could be turned to make a canopy of falling water which would soak the imprisoned visitor if he attempted to escape. Sadly Bushell's garden has disappeared but pictures of the grotto and fountains can be seen in *Plots Natural History of Oxfordshire.*

Alexander Pope finally set the fashion for grottoes in England when between 1720 and 1725 he made one in his grounds at Twickenham. It is a cleverly devised subterranean passage connecting two parts of his garden. Pope described it as a luminous room, "finished with shells and interspersed with pieces of looking-glass in angular forms. . .when a lamp is hung in the middle, a thousand pointed rays glitter and are reflected over the place." Strangely, at this time, Pope was attacking the formal, artificial garden, although his grotto had both these qualities. It took several years for grottoes to change and become dramatic natural caves composed of rugged fallen rocks creating dramatic natural caverns. Whatever their character they were always the place for contemplation.

One of the finest grottoes still in existence was made by Thomas Goldney at Goldney House, Clifton, Bristol, between the years 1757 and 1764. As you open the door you find yourself in a haunting and beautiful cavern. Four pillars support the roof and everything is encrusted with jewel-like shells, mother of pearl, fossilized coral with ammonites, huge clam shells, and a quarter of a million small sea shells. A lion and lioness stand guard while Neptune reclines near tumbling water. It is a perfect work of artificial delight and afforded Goldney the opportunity to display the marvelous shells his ships brought back from the West Indies.

A grotto which until recently has been



Photos by Peter Loewer

A buddha gazes at a silver plantago, Plantago albicans.

Concrete putti gazes across an Ohio landscape.

Photos by Peter Loewer

An old mill wheel becomes garden sculpture standing behind a planting of the common rush, Juncus effusus.

A fu dog surrounded by Cotoneaster *'Waterfall'*

Photo by Peter Loeuer

A buddha surveys an entire garden.

Photo by Elvin McDonald

A single clump of Japanese iris (Iris kaempferi) *blooms in Brooklyn Botanic Garden's Japanese Hill-and-Pond Garden. The simplicity of the leaves alone suggests the Eastern notion of less is more.*

Top: *A small terra-cotta spirit of the garden.*

Middle: *A concrete fu dog turns his back on the garden. The plants are common* Ajuga *and* Plantago major *'Purpurea.'*

Bottom: *A sundial in a country garden.*

Photos by Peter Loewer

ignored is that in the grounds of Marlborough College in Wiltshire. It was made by Lady Hertford in the 1730s being built into the side of a Neolithic mound. A spiral path fenced all around with quickset hedges was cut into the mound and on the summit was a summerhouse with a pond for its roof. As a visitor ascended he could sit in niches that were provided with seats in order to admire the countryside and also the overgrown 17th Century formal garden which by Lady Hertford's day had become an 18th Century wilderness.

Lady Hertford described her grotto as being newer and prettier than Pope's. I can only describe it to you as it appears today, for the Hertfords left Marlborough in 1750 and no more was heard of the grotto. It became a suitable bothy (a shelter) for the gardeners where they could sit and keep their tools. Now through the inspiration of Diane Reynell and the fine workmanship, imagination, and research of Simon Verity, this grotto is once more coming to life. The wooden doors have been opened and will soon be removed. The sun now reflects into a small circular pool at the entrance and throws light onto the vaulted ceiling of the central semicircular apse. Water will flow from a niche at the back, falling into a huge conch shell. The walls of flint are encrusted with Ormer shells from the Channel Islands and a beautiful shining blue vitreous material, the waste from an 18th Century iron works. There are also oyster shells and Bristol diamonds, a red sandtone matrix studded with quartz crystals.

In a beautiful script lettering, Verity has carved the following lines composed for Lady Hertford by the thresher poet Stephen Duck (who was later taken up by Queen Caroline):

"Within the bases of the verdant hill
A beautious grot confesses Hertford's skill
Who with her lovely nymphs adorns the place
Now varies rustic moss about the place
Now fills the shining pearl and purple shell."

This will be a place of contemplation for the Marlborough College boys when the full use of water and light bring sound and reflection even as far as the side bays where shadowy flint figures occupy niches.

I was fascinated by the floor pattern. There cobbles set in clay interspersed with lines of polished horse teeth cut in sections. On the walls a mysterious thread of white calcine flint winds its way. Then looking up one wonders, does the ceiling represent the sky or is the whole grotto under the sea? By tradition this is the birthplace of Merlin, and here wonders never cease.

But we have traveled in time and must return to the 18th Century. As the taste in garden design changed so the character of the grotto developed from the artificial with shells and colored stones to a more natural and rugged look.

The Stourhead grotto built in the 1740s gives romantic views over a lake. No shells adorn the walls; instead the impression is of a natural cave with falling rock. As a young man, Joseph Lane worked here and later he and his son Joshua were to become the most renowned grotto makers in the country. They worked at Painshill near Cobham in Surrey for Charles Hamilton and at Fontwell for William Beckford. The Painshill grotto was made on an island in an artificial lake, constructed of brick covered by limestone tufa. The whole effect was to represent a scene from nature. The central chamber is approached by an underground passage where light filters through holes in the outer wall, allowing glimpses of the lake. Water trickles and then seeps out adding an air of mystery.

One could spend weeks discovering grottoes throughout England but the philosophers and garden makers of the 18th Century were not the only builders of these garden ornaments.

Recently a dead elm was felled and the sight of its huge roots—the vast hole it left—set the imagination of Andy Garnet to work. The site was at the end of a long grassy vista just beyond a statue backed by evergreen bushes. The statue could well have been the final event in the garden. But now a surprise awaits the observer. A path winds its way ever deeper and deeper through hollies, privets, and ferns, getting darker as the path seems to move down into the womb of the earth. This is an illusion for the descent is really soil displaced by the fallen tree now mounded up the sides, creating natural walls through which you wind your way until finally reaching the inside of the grotto. Here under a caving roof skillfully constructed by Andy's engineering brain, water drips continuously into a shallow pool before running on its natural course. Enough light streams through a central ceiling cavity to bring life to the water and green to the hart's tongue ferns which burst from the crevices.

A grotto revival may be in its infancy. Certainly 18th Century grottoes are receiving more attention and care than they have done for years.

All Photos by Author

A glazed building tile from the facade of an old opera house adds a decorative touch to a garden fence.

Mussel shells are arranged in the shape of flowers on a bed of black river rock. They provide contrast to the rock and the dark green leaves of the camellias.

Found Objects For The Garden

Lorraine Marshall Burgess

Garden ornamentation can spring from unlikely sources. Today many find inspiration and material in the debris and discards of our affluent times. The sources of raw materials seem quite endless and most are available by purchase or scavenge. What we produce may differ from that of our forebears, but no matter the style or subject matter, we carry on the tradition of invention associated with gardening.

What seems to sustain 'found art' is the fact that one man's discard is another man's treasure. Materials available range from brass to glass, from stone to bone, timber to krumholst, old iron to new plastics and ancient tools to architectural remnants.

Creating garden decoration can become an avocation. The task makes a great escape during the winter doldrums and continues to delight through the hectic days of summer.

The best imaginative excursions spring from within. Resist the instinct to be practical. Be as receptive as pre-school children. Once you catch the spirit of individual thought, follow where mind and instinct lead you.

Dividends

You may find yourself studying shapes and textures with a new awareness. The entire family may become involved. And just as you consider cause and effect when planting a young dogwood in front of a stand of evergreen, so too should you contemplate the best placement of an art object along a garden path.

An old clock finds a new home on the garden wall where time isn't measured in hours.

Inspiration can spring from a handful of iridescent mussel shells. By pure instinct you might arrange them in a floral pattern. Or you might start with an old lawn-mower reel, upend it on a stout post to turn in the wind. The double helix is naturally beautiful. If a critic demands an explanation, tell him about the

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Lorraine Marshall Burgess of Colorado Springs finds art and gardening companionable pursuits. She paints, writes, and photographs the pleasures of gardening for regional and national publications. She has authored the book, Garden Art.

An interesting art form is found in a rock—a natural piece of sculpture.

DNA molecule—the chain of life. Isn't that symbolism enough?

If you prefer a vigorous approach to art, consider the expressions of a Denver couple who marked the completion of their concrete terrace by hanging an old canvas glove, laden with fresh concrete, on a reinforcing rod set in the border. Once hard-dried it became a monument to their labor. Their unconventional approach once affirmed they then hung the remnants of a Flexible Flyer sled on the fence nearby, perhaps as proof of their interest in selected oddities.

If your first efforts seem less than satisfactory, set them aside for evaluation another day. If they seem promising, keep them about to see if they withstand the test of time. Make improvements as they suggest themselves. Great artists have been known to labor over their works for years. Some are never satisfied.

If you have a woodpile, check it for marvels the wood-cutter may have fashioned. Pull out the more engaging chunks and add a few touches with a sharp knife or paint brush. Then set the resulting art on a modest platform to stand among the flowers. Mounting adds significance, implying that you, at least, think of the item as art.

As your inventory of raw materials dwindles, go to the ironmongers for more durable finds. Odd objects are often available for 10 to 15 cents a pound in the form of old stoves, gears or sheet iron. Slender cast-iron stove legs make good starter material. An elongated leg embellished with eyes and a mouth, in the Modigliani manner, might serve as a surprise accent in a lilac garden.

A four foot tall iron pipelifter, fresh from the junkyard, looks a good deal like giant ice tongs. Costing a mere $25, it is authoritative and durable, and also looks like a Claes Oldenburg sculpture. Claes, you may remember, makes big-city monuments of giant baseball bats, lipsticks and clothespins.

Enduring Supply

Wonderful objects await our attention in the backwaters of our land. Flotsam and jetsam bring their own riches in strange and unexpected forms. On the California coast three large iron rings were salvaged from a driftwood beam and reassembled as a jeweled setting for a green-glass fisherman's float. In the same garden an iron gearbox from an auto salvage yard was expanded to form a solar-heated bird feeder. The costs of such items are minimal. It's imagination that gives them worth. A whale's skull, hauled up from the sea hangs on a California garden deck.

While discards of shores, farms, and cities appear inexhaustible there are other places to search. The beachcomber gathers shells and surf-smoothed rocks. The rock climber pockets a pebble. The geologist brings home a geode with an amethyst lining. What is 'found' seems negligible compared to that which remains.

If the act of scavenging gives you qualms, shop second-hand stores and salvage yards. If you are into historic preservation you might bring home a stone or a tile from a demolition site to set in your garden. English gardeners gather stone carvings and arrange them in moist corners with ferns and mosses.

Loved Though Derelict

Throughout garden history there is evidence of artistic striving. Fanciful topiary, monster heads carved from huge boulders, and embroidery patterns made with colored sands are a few. The use of water delights us. In 62 A.D. Pliny the Younger wrote of his stone garden table that could be filled with water for festive dining. He explains. ". . . the larger plates are placed around the margin while smaller ones swim about in the form of little dishes and waterfowl".

Since then, caves have been embellished with seashells, giant trees fitted with staircases and peacocks invited to stroll in French and English gardens. American gardens reflect this history with mazes, moats and peacocks too.

Today sculpture gardens display more modern instincts and tendencies. But garden art needs more participants. The conversion of found objects into personal designs can be a very good place to start.

A baptismal font displaying carvings of deer, squirrels and fox intertwined with grape vines becomes the watering and bathing place for birds.

Water Ornament in the Landscape

Jolande E. Goldberg
Lotte Dolezalek

Water in the garden has many facets and moods. Its sight delights the eye, its sound is music to the ear, its movement equals the vigor and grace of a dance, and its mirror qualities create additional space, depth and light. Our theme is water as the integral part of the garden or as the challenge to create garden ornament in perfect harmony with its surroundings. Over the centuries, styles and tastes have changed. It is our objective to look at the features and forms that have prevailed; they make us aware that we are the heirs to a long tradition in the East and the West.

Prevalent styles of water gardens of the past. Since earliest time man's relation to water has vacillated between fascination and fear: water

Photos by Jolande E. Goldberg

Fountain bowl of cast bronze or high-fired stoneware with black-bronze treatment is on a pedestal. Wall can serve as a place to sit. (Illustration 1)

Jolande E. Goldberg is a sculptor and the principal designer and artist of large scale architectural elements, water murals, fountains, and garden sculpture for her company the Studio Free Form, Inc. She was educated and trained as an artist and lawyer at the University of Munich, West Germany and Goldsmith College, School of Art and Design, University of London, England.

Lotte Dolezalek was born in West Germany and has studied French, English, and German literature in addition to art history. She is a sculptor with an emphasis on portraits and the masks of the human face and is a partner of Jolande Goldberg in the Studio Free Form where the emphasis is on fountains and garden ornaments.

Fountain titled "Unfolding" is cast of bronze (two and a half feet high on a four foot high pedestal) and placed in a woodland pool. (Illustration 2)

has been the source of life as well as its destruction. This belief is reflected in the bathing rituals and baptismal ceremonies of various cultures. The earliest images depict water as the center of the universe, as a spring at the foot of the cosmic tree. This myth also underlies the concept of the oriental garden and climaxes in the Paradise Garden of Persia and Mughal India.

The basic design of these gardens has undergone little change through the centuries, as their plan reflects the religious concept of Islam. Canals divide and subdivide the rectangular space. Their course is interrupted by basins of different geometric shape, e.g. hexagons, octagons, circles. There are also basins of different sizes with foliated edges or in the form of a trefoil or lotus.

The Greek and Roman gardens reflected the heritage of the Eastern gardens, with sculpture now given a prominent place.

The Baroque perverted the idea of the garden as a paradise. During the absolutist period the nobility turned the garden into a parade ground of allegorical figures for the powerful self-expression of the ruling class. From the mid-18th century on, however, major changes in garden design and ornament began to occur.

In the latter part of the century (the Victorian or Wilhelminian era) lavish city residences in the palatial style and Italian villas with extensive parks were designed to house art, and garden art appeared in a variety never seen before: pieces of archeological interest and other collectors' items from centuries past (capitals, urns, baptismal fonts, sarcophagi, triple tier fountains, etc.). Finally, industry, by mass-producing these prototypes in all materials known at the time, made them available and affordable also to the average gardener.

This was the European scene the Americans encountered during the latter part of the 19th century in the course of the intense cultural and educational exchange between the eastern United States and Europe.

After a short, but intense bloom, the 20th century has seen a rapid decline of garden art. Two world wars and long postwar periods of reconstruction and modernization placed unprecedented demands on western society. The Bauhaus period replaced ornament with functional features. Old-time craftsmen disappeared and industrially pre-fabricated elements came

An oblong box is lined with copper to contain water for the collection of aquatic plants. It is decorated with relief panels of high-fired stoneware.
(Illustration 3)

into their own. Education shifted in its priorities from the arts and humanities to business and technology. But despite the centrifugal force of technology, the quiet undercurrents of back-to-nature and reform movements of earlier parts of the century surfaced in the new conservation movement. With it came a broad awareness of dwindling resources, and increasing threats and burdens to the environment.

The role of water and water sculpture in the modern environment.

Pressure on land for new development has grown steadily, placing unprecedented value on the grassy plot. Although the general preference for easily-maintained garden plots has begun to change, artistic development comes rather slowly. Yet in the shrinking environment, attention to the visual quality of space is of prime importance. One of the most effectual design elements is water in a wide variety of presentations.

Water walls and murals in garden courts.

The garden court, usually framed by brick or timber walls, provides privacy, a sense of security, and a very strong definition of space. In the milder climate zones with early spring and prolonged autumn weather, such a court serves as an additional living area and natural extension of the house to the outdoors. Walled and fountained courts can appear much larger by introducing a sculptural element placed at the right perspective as a focal point. Set back against the wall opposite the house, a water mural or water wall will create visual depth and drama. Water guided gently over the panel or masonry is caught in little crevices or drips down from small shelves. The water receptacle or tank underneath need not be wide; if one side forms the edge of the terrace, it will not take away much of the sitting area.

The blue water mural "Undine" [Illustration 5], reminiscent of 19th century highly-stylized conservatory decoration, is shown free-standing in a pool. The water flowing out of the lower mask into a vessel at the base of the panel adds visual quality to the flow of water and creates a lovely sound. The panel is adorned by an array of summering greenhouse plants and

trees, enhanced in color and mood by the blue *Agapanthus*. The shape and rhythm of the work is suggestive of use in multiple sets of panels either mounted as a fencelike backdrop for a garden court or terrace, or set up in a semicircle for a formal pool.

Small water courts with circular fountain basins.

For a miniature pool where elevated structures are out of scale, small urns with a gentle overflow of water are a good choice. They lend themselves to urban or suburban patios and gardens that have a certain formality. The water basin has a flat broad curb, level with the ground, which forms the transition from the paved court to a natural planting area. In Illustration 1, the basin rises about a foot out of the planting. The mirrored water table reflects the bronze fountain vessel from all sides; the smooth coping on the basin and the adjacent wall also serve as sitting places.

"Dark Masque" is a fountain vase with the water flowing from under the lid of the vase. It is placed in a pool with aquatic plants. (Illustration 4)

Free form pools and sculpture.

In the pool of a woodland area, other effects can be achieved by a major sculptural piece or fountain. A tall piece rising above the water expands the visual space by its play against the vertical lines of the trees, and its extension by reflection downward. The mirrorlike reflection of the pool also adds light to the location. The bronze fountain "Unfolding" [Illustration 2], set in a free form woodland pool adjacent to a shaded terrace, alludes to the poetic imagery of life rising in spring from the depth. Under a dense canopy of deciduous trees, the surrounding plantings take advantage of the sun in spring before foliage appears, providing a breathtaking display of flowering shrubs underplanted with drifts of wildflowers. The "Dark Masque" fountain vase [Illustration 4], shedding water from under the lid, alludes to the mystique of deep water, as it rises over a still pool. It signalizes the dark of winter, but also the rebirth of spring — the drama and the promise.

Formal pools and reflecting pools.

Formal circular pools have always been a splendid foil for showcasing a piece of water sculpture or a fountain structure. A fountain composed of a group of flowing urns of different sizes [Illustration 6] is shown in the circular pool of a paved and balustraded terrace, flanked on either side by rather massive pergola structures. It is fascinating to observe how the vertical fountain, playing against the vertical lines of the pergolas, defines them as distant shapes and brings the interest down to the foreground terrace, arresting the attention for a display of specimen plants.

The same principle governs an assemblage of a terra cotta water garden. A "Satyr fountain" is placed off-center in a large, shallow, semiformal reflecting pool. It acts as a resting point for strollers drifting between two large and unshaded public areas. The warm, sun-related terra cotta color of the statuary takes advantage of the bright bloom of annuals; it is interwoven here with summering greenhouse plants.

The "Fountain Head" is another interesting water sculpture for an elongated reflecting pool set in a paved terrace [not illustrated]. It lies at the

"Undine"—a water panel of blue-polychrome glazed high-fired stoneware with male and female masks. The panel is mortared to cement/fiberglass board which is set in a steel frame. All fountains illustrated in this article recycle water by an electric pump. (Illustration 5)

water surface and conceals the entire mechanical works of a jet fountain. Depending on the size of the pool, it is most effective when used in pairs or multiple sets.

Trough shapes and aquatic planters.
There are many uses for aquatic containers as a substitute where space is limited or the construction of a pool is not possible. They can also be used for a special decorative effect in a pool when displaying beautiful or rare plant specimens, in this case, slightly raised on a stand above the other plantings. The square or rectangular type with its ceramic relief panels [Illustration 3] is an allusion to the sarcophagus which has been a choice garden feature since the Renaissance.

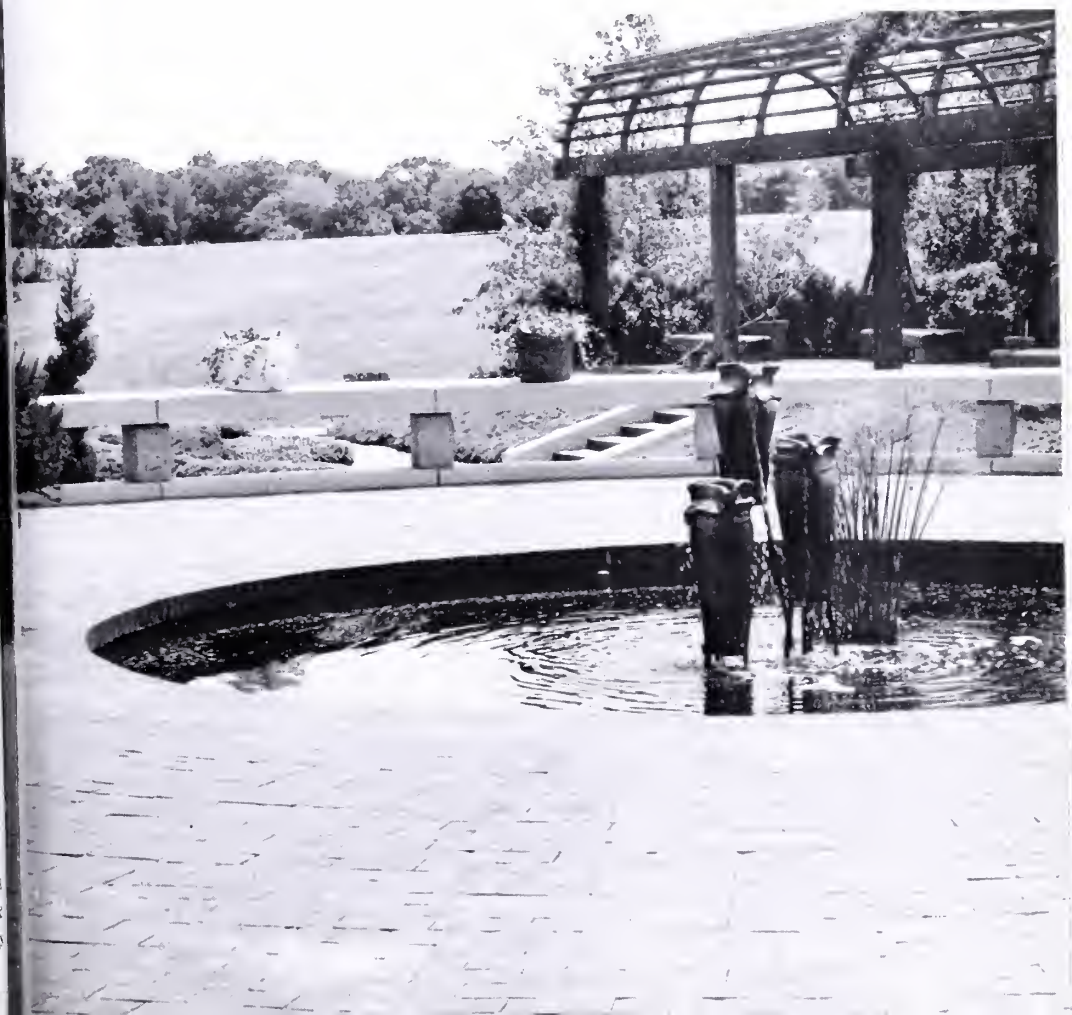
The Dialogue between the Gardener and the Artist.
Art integration in the landscape is ideally achieved where both gardener and artist work together in mutual understanding and support. In this sense, the garden plan is the abstract frame upon which all patterns of visual quality are to be assembled.

It is essential to explore existing or newly introduced structures and plant materials, and to study the rhythm of forms and textures. Views from different sides and from a distance are as important as the appearance from close up, especially in a spatially more modest setting. In the best of all collaborations there is always a grain of competition; both artist and gardener have to rein in their egos. They might not share the same view — the artist may look for the most striking display of his work, while the gardener possibly views the location of the art work as visual interference with his own intentions. However, one should look at the gardens as a playground for the visual interaction of the "humanesque" and nature, where the "things

planted" — both statuary and plants — give definition to a space: where they enhance the garden structure in their interplay; where they create perspectives, vistas, thus achieving visual expanse; where sculpture adds visual interest to the flow of water; or where water is used to complement a form, or is conceived as part of the decor completing the form. In any environment, the balance of the different parts should be the underlying principle.

Beyond the mere esthetic, garden sculpture emotionally touches the observer as it signals a deeper meaning, triggers associations, or stirs the curiosity and invites analysis. Therefore, it is surprising how slow the humanist element makes its re-entry into the garden, especially so since there is such a rich tradition in garden art. Does the gardener hesitate because the past has carried garden art to the ridiculous with its catalogue of mythical figures to be properly fitted by their symbolic quality into land or waterscape? Or is the gardener ill at ease with myths and symbols after such a prolonged period of abstraction and silence? Or have we lost our sensitivity and knowledge of the mystery of nature and the myth surrounding it? Are all images and names, severed from their meaning and associations, gone forever? Here, artist and gardener together must be re-inventors and interpreters of the mystery of the garden, and preserve for the future this most precious quality. When it is lost, paradise is lost — forever.

High-fired stoneware with black-bronze surface treatment makes up this triple-urn fountain. It is located in the Herb Garden of the U.S. National Arboretum.



All Photos by Author

Water trickles from bamboo spout into this stone basin, which captures enough liquid to float a single azalea blossom, mirror the sky and reflect surrounding ornamental grass.

Seven elements compose this tranquil scene at the entrance to the Viewing Pavilion in Brooklyn Botanic Garden's Japanese Hill-and-Pond Garden: Stone lantern with lichen-encrusted roof, Chamaecyparis obtusa *'Kojolcohini' (a dwarf conifer), grasslike green-and-white-striped* Liriope, *stone water basin, stepping stones and pebble mulch, with fence backdrop that alternates verticals of wood and bamboo.*

The Japanese Touch

Elvin McDonald

The creation of a complete Japanese garden is no mean task, especially for the Westerner, yet the Japanese touch is readily achieved. In my city apartment for example there is a large Japanese lantern over the dining table. Floral centerpieces stand on a footed lacquer tray from the Orient. I don't have bonsai, but numerous plants grow in bonsai containers. Moreover, the cultural techniques used to keep dwarfed trees vital—regular root and top pruning—work as well for full-scale potted trees. The photograph in the color insert and the seven here suggest inviting ways to employ the Japanese touch within the larger frame of a Western landscape.

Elvin McDonald is a well-known garden columnist and photographer, and is the Director of Special Projects at Brooklyn Botanic Garden.

The disappearing path, a hallmark of Japanese gardens, is here delineated in a Minnesota landscape by hostas and ferns from Japan, with natural stone paving and steps. Together these elements provide for aesthetic placement of a stone lantern.

Right: *Bamboo is used universally as a construction material in Japanese gardens, with the joints secured by strong twine, often elaborately tied. Here a low fence is seen in a garden installed by the Japanese government at an international horticultural exposition in the Netherlands.*

Below Left: *The bonsai displayed on this porch offer an obvious Japanese touch. Less noticeable, yet unmistakably Japanese, are the simplicity of unfinished wood and the arrangement of paving stones in paths leading to the steps. Garden of Mr. and Mrs. W. Jeter Eason, Memphis.*

Left: *A sitting Buddha resides at the foot of a potted gardenia, trained as a tree-form standard, and gives a hint of the bonsai collection that will come into view as the visitor takes a few more steps. Garden of Mr. and Mrs. David B. Martin, Memphis.*

Below: *Even though Japanese holly* (Ilex crenata) *is from Japan, it gives no visual clue unless appropriately trained. Here, cloud pruning effects the Japanese touch for a specimen in Brooklyn Botanic Garden's Japanese Hill-and-Pond Garden.*

All Photos by Author

Tsuga canadensis *'Lewisi' is over 20 years old. It was trimmed several years ago and recently trimmed again. It is three feet high and less than two feet wide.*

Decorative Values in the Rock Garden

Louis Budd Myers

Building a rock garden is a long, arduous, undertaking. Almost every book on the subject gives detailed instructions for the proper use of rocks. Each person must cope with the limitations of his own site. Alpines and most rock garden plants require excellent drainage.

Rocks do have decorative value. Tufa, a calcareous sinter sometimes called calc-tufa, adds further interest. It is formed by calcareous waters which deposit lime encrustations on objects exposed to their action. Tufa has a vesicular texture, one made up of small cavities, and has become what appears to be a porous rock much lighter in weight than most other sedimentary rocks.

Tufa has a light ocherous-creamy color when taken from its original bed and gradually weathers to an earthen gray, sometimes almost ebon. The exposed layer may be encrusted with mosses, leaf remnants, tree trunks, twigs, anything that was trapped nearby when the calcareous layers were laid down by the water. A similarity to weathered ocean corals is sometimes noticed.

Interestingly enough, many plants will grow directly in tufa, plants that need perfect drainage, those that are small, bunlike, and ground hugging. They grow without being crowded or over-powered by more robust neighbors, and the tufa rarely has to be weeded. Tufa makes a splendid setting for depicting the individuality of each plant.

By careful selection, various sized pieces of tufa (the larger the better) can be moved together to make an impressive tufa mound, wall, or cliff. To achieve height it is preferable to build into a low soil bank. The base of the tufa pieces should be placed below the surrounding soil level so that moisture will be carried by capillary action to the plants. Tufa may be chipped easily with a hammer to make edges align. Cement between tufa pieces may help to create continuing walls to hold back soil.

If there are not enough natural pockets in your tufa to hold a sufficient amount of soil to bind the roots of your plants (seedlings or small rooted cuttings are the most appropriate for planting), use a drill with a half-inch or three-quarter-inch bit that will make holes three or four inches deep. With little pressure any type of bit penetrates tufa. Use an icepick or other small, slender tool to help guide roots into a pocket. Gradually force soil down around the roots and use small amounts of water to help settle the soil compactly. Small pieces of tufa should be pressed into the hole around a plant crown so that the surface of the tufa looks as though it had not been disturbed and so that the soil will not wash out. The tufa pieces also help to retain moisture in the pocket. Most plants thrive in tufa so I use a somewhat neutral soil mix for planting, combining some sand, peat moss, and humus, with a touch of powdered manure. If a plant is a renowned calcicole, I add some finely crushed tufa.

My garden is in the upper reaches of the Poconos in northeastern Pennsylvania, where temperatures sometimes reach -20 °F for prolonged periods and may dip to -30 °. Many plants that grow in tufa will grow in no other parts of my garden. Among them are *Draba mollisima* and *D. polytricha*, *Arenaria hookeri* var. *desertorum* and *A. tetraquetra granatensis*, *Erigeron allocotus*, *Campanula morettiana*, *Gypsophila aretioides*, *Arabis androsacea*, and many kabschia and encrusted saxifragas. Some plants have been growing for more than a decade. A tiny form of maidenhair spleenwort, *Asplenium trichomanes*, seeds

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Louis Budd Myers is a well-known rock gardener. He was for thirty-three years an editor and writer on the staff of a national biographical encyclopedia and has contributed many articles to the American Rock Garden Society, The Conifer Society, and other scholarly journals.

Picea abies *'Gregoryana' is at least 23 years old and grows over a tiny field of alpine grasses and drabas. It measures two feet in height and two feet in width.*

itself on the walls of moist shady crevices. In addition to some discouragingly low temperatures, in other seasons of some years the garden may suffer from periods of excessive rain.

Tufa can be used on the edge of a lawn to create a miniature rock garden, or a large piece of tufa may serve as a centerpiece in a tiny garden created within the confines of railroad ties or a circle created with a short section of the largest drainage tile.

The tufa garden benefits from some shade, with perhaps six or seven hours of direct summer sun each day. The sun does not reach my garden until midmorning. The tufa cliff receives no more water than the rest of the garden. It is well fertilized annually with a broth made by steeping powdered cow manure (place in water for a couple of days, or until the broth is a very dark brown—use two cups of manure to a gallon of water and strain the broth before application to remove the sludge). Each spring all of the exposed crevices between pieces of tufa and at the crown of each plant must be checked and, if necessary, refilled and tamped. My tufa mound is snugly covered with pine boughs each December and uncovered at the end of March.

You may seek sources of tufa by contacting members of the American Rock Garden Society, geology departments of state universities, or knowledgeable nurserymen. I obtained my tufa in central New York State in an area called Ilion Gorge near the town of Ilion, just southeast of Utica.

A few years ago I decided that many of the conifers had to be transplanted to borders or lawns or be destroyed because they were overgrown. At about that time I noticed that a friend removed the branches of a dwarf columnar three-foot juniper from soil level to one third of its height so that a group of plants nearby would be exposed to more light. My problem was on its way to being solved.

I began slowly because I did not know what effect my pruning would have on the health of my trees. I removed a few lower branches at a time, and over a period of two years the garden opened up to a show vistas that incorporated habitatlike groups of many small rock garden plants. Partial shade and elemental protection was supplied for many plants.

The adult bark on the exposed trunks became an added feature. The trunks give the observer a sense of age and stability, a timelessness that tends to match and enhance the durability of the nearby rocks.

The trees are delimbed only on the trunk. Tops are not shaped, although about three-fourths of each candle on new pine growth is nipped off. Some prostrate junipers are cut back rudely but none trimmed into preconceived shapes. Each tree has its own character.

A result of the cutting and polishing, is the pleasure of a snowfall. New shapes and unexpected colors are found in each tree when seen against a white background. The early winter garden itself has a new shape.

Without the slow-growing trimmed conifers, the garden would have little of its present appeal. Although they lack the flamboyance of their herbaceous neighbors, the conifers evoke a fascination.

Bottom Pinus strobus *'Nana' is nearly 15 years old and is trimmed here and there nearly every year because of its dense umbrellalike growth habit. It provides some shade for an array of plants. This pine measures three feet wide and two feet tall.*

Top *A portion of the western side of the author's tufa mound.*

Urban Art on the Garden Wall

Natalie Kempner

Some 18,000 years ago, deep inside the caves of Spain and southern France, hunter artists first learned to abstract the world of their experience. Using reeds for brushes, and chunks of ochre for color, they painted the animals they knew: wolves, reindeer, bison, horses. And so was born that uniquely, characteristically human ability to create images and symbols that gives human beings awesome control over the environment.

Lest this be deemed a far-fetched introduction to a tale of mural painting in today's Philadelphia neighborhoods, I hasten to submit that when hundreds of city dwellers, mostly kids, translate their urban experience to the weather-worn walls around their gardens and their streets, the artists are demonstrating the same keenness of observation and are moved by the same deep urge to express what is important in their lives as their Paleolithic foreparents. The feat of abstraction is no less startling, nor any less historic, than those first lines in Lascaux.

"West Kensington Kids Hearken to the Call of Pride!"

"Mural Premiado en la Escuela Miller por Oic!"

"New Mural by Youthful Artists Graces Norris Square!"

"Budding Artists Hard at Work on Mural for the Flower Show."

Such are the headlines heralding the accomplishments that have become a way of life for the children and youth of a long neglected North Philadelphia neighborhood. It was not, then, mere chance that Philadelphia Green, the Pennsylvania Horticultural Society's community outreach program, called on the Norris Square Neighborhood Project's crew of mural experts to produce the mural needed for its 1983 award-winning entry in the Philadelphia Flower Show. Young artists worked a whole weekend on hands and knees to create the cheerful street scene that covered one end of the exhibit's block of city row-houses, designed to illustrate urban greening possibilities.

In the spring of 1977, the Pennsylvania Horticultural Society's 150th Anniversary Horticultural Advancement Project Committee supplied funds to the struggling Norris Square Neighborhood Project (NSNP), an environmental learning center on Norris Square Park, a tree-filled oasis in the midst of deteriorating West Kensington. NSNP had begun in 1973 in the basement of 80-year-old Miller elementary school with the conviction that neighborhood children, whose scores on standard tests were the lowest in Philadelphia, could improve their "basics" through exploration of the world outside the classroom and away from television.

By 1977, NSNP had acquired its own building, a 19th century townhouse on the Square, next to the school. Neighborhood exploring had proved that one's living space is exciting and valuable even if parts of it happen to resemble the aftermath of war.

As awareness increased so did efforts to find appropriate ways to affect the quality of the community. Because it is possible to grow up in North Philadelphia as it is today, totally oblivious to the sources of life, the first such specific effort was The Asphalt Garden. Here vegetables and flowers flourished in a tiny plot built on top of the asphalt school yard with railroad ties from the nearby abandoned Reading tracks. Gardening children came to understand the relation of seed to flower to fruit and to respect green plants as the basis for life on earth. The big new vocabulary word was "photosynthesis" and everyone learned it.

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Natalie Kempner is the recipient of the Pennsylvania Horticultural Society 1976 Teacher of the Year Award. She is the founder, retired director, and current board member of the Norris Square Neighborhood Project; member of the Philadelphia Green Advisory Board; P.H.S. Council; and vice-chair of the P.H.S. Junior Show.

The garden was just a beginning. Planters designed from plastic bottles and discarded hubcaps hung from fire escapes and fences. Tires, rolled in from vacant lots, became sidewalk gardens. Plant sales, workshops, summer gardens on vacant lots became the order of the day.

When critical eyes were cast on surrounding walls, ways to enhance grey, graffiti-filled spaces with natural life where none could grow were dreamed up. In the spring of 1977, the time was right. Nature in the City—mural number one—was conceived.

Nature in the city: the first mural

The PHS funding gave encouragement. An energetic group of 11-and 12-year-old youngsters known as City Searchers were prepared to translate their new urban awareness to the side of the rowhouse bordering the school yard. The Urban Outreach Department of the Philadelphia Museum of Art was available to advise about materials and techniques.

Most crucial, though, was Andrea. Andrea Raffel had left her job as Miller School's art teacher to work with NSNP. Most of us can fantasize wondrous murals on cement walls, but Andrea possesses the magic to make them happen. Not to make the murals, mind you, but to make them happen. She, the artist, rarely wields a paintbrush, but is rather the magician who allows anyone involved to discover and explore unimagined creative potential and so to transform ugliness to beauty.

Andrea and the young City Searchers sketched an overview on a roll of brown wrapping paper taped to the wall. They plastered cracks, rolled on white background, and painted the basic outlines: the big yellow sun, the three tall London planes and the small ginkgo. And then, the area around the mural was roped off and hour after hour, for one sunny April week, children left their classrooms to become Artists at Work. Anyone in the school or neighborhood could contribute. The only prerequisite was that the artist come with a sketch of something that lives or grows in the city. Ladybugs, worms, toadstools drawn on grubby scraps of paper, some no bigger than a postage stamp, were held out for inspection.

Pennsylvania Horticultural Society invited the Norris Square Neighborhood Project children to do this mural for the 1982 Harvest Show demonstration sitting garden. The mural is a re-creation of their own neighborhood including their greenhouse behind the white picket fence.

A stylized palm tree done for a garden on North 2nd street in Philadelphia.

The only censored item was Sammy's elaborate pterodactyl, designed to be silhouetted against the sun.

At the week's end, some 400 artists could point with pride to their personal contributions to a prodigious masterpiece of color, style and imagination. Caring for school property increased and spread. During the summer, the neighbors next door painted their house the same bright greens, yellows, blues of the mural. The only graffitti was one chalked-in butterfly.

In May, NSNP won the Environmental Action Award at Schuylkill Valley Nature Center and, in November, the Sol and Rose Foundation O.I.C. Keep Philadelphia Clean and Beautiful Award.

Nature in Puerto Rico: the second mural

Since 85% of the Norris Square neighborhood population is Hispanic, it was logical that the second mural should be Nature in Puerto Rico. This time, students from Germantown Friends and St. Boniface Schools, participating in a NSNP Exchange Program, worked with Miller kids. They researched the flora and fauna of Puerto Rico and worked together to produce a bright blue sea, alive with marine creatures, leading to the rainbow-covered island luxuriating in a profusion of coconut palms, flamboyant trees, exotic birds and blossoms.

Miller School was closed in 1979 and demolished. Nature in the City and Nature in Puerto Rico adorn the walled-in grounds of a new Senior Citizens' Center. Eight additional murals have been completed with Andrea's magic and a continuing outpouring of group creativity.

The single exception to the usual group process is Nature in Africa, the gift of Remy Lyimo, an artist visitor to NSNP from Tanzania. Remy carried Project ladders and paints five blocks west of Norris Square to design a backdrop for a Philadelphia Green garden on the corner of N. Third Street and Susquehanna Avenue. Teenage dropouts and young adults turned out to plaster and whitewash and to marvel as Remy painted the landscape of his home in Moshi, on the lower slopes of Kilimanjaro. Teenage artist, Kenny West, lives across the street from Remy's mural. The paintings he displays at neighborhood festivals quite often portray rushing streams and snow-capped peaks, which he calls "The View from My Front Window." In North Philadelphia?

Remy's mural inspired his Third Street admirers to get NSNP help for further block improvement to include gardens, a Tot Lot, playground and murals. Every non-rainy Saturday and Sunday in the fall of 1979, 30 to 40 people, tots to grandparents, swept, raked and painted trash barrels, hydrants and telephone poles. Andrea with her wizardry had toddlers flat on their stomachs making designs and teenagers scaling ladders to outline a stack of giant building blocks on a three-story wall they had painted white. Each family in the block chose building blocks in which to make paintings that varied from dandelion plants to basketball stars.

That 2100 block of Third Street was not transformed into a beauty spot. Daily life on Third Street is hard and getting harder. The priority is jobs, not environmental awareness — or even gardens and play lots. The two murals, still bright and ungraffitied, remain the only bits of color in a dismal landscape of forsaken rowhouses, unsettling tributes to brave attempts to turn things around at least a little—memorials to a few weeks of exciting work and high hope.

Wall art has long proclaimed the truths of people in their time and place: drawings on cave walls, paintings in Egyptian tombs, frescoes on the walls of cathedrals, political statements on the buildings of post-revolutionary Mexico and in the halls of New Deal U.S.A.

Today's truth appears on the public walls of our cities more visibly than ever before. Most of it is not art, nor is it intended to be. The messages on our walls, called graffiti, are unwelcome and threatening and we try to wash them away or cover them over. More than one million dollars is spent each year to remove Philadelphia graffiti but, so long as it is the angry, frustrated expression of those with no access to power, it will pervade. Efforts to deny it by covering it up are to no avail. Channeling the energy and talent that produce it, is.

I have never known Andrea to have the slightest problem getting a graffiti expert to opt for paintbrush over spray can. What if the city let this year's graffiti stay where it is, a reminder of urban alienation. And what if the clean-up money were used to let Andrea and her mural artists be the inspiration for a gigantic wall-painting program called Art for a Change! What if every neighborhood could experience the excitement of brightening forlorn grey spaces!

This grotto framing a stone and mirror sculpture by Raf Fulcher terminates the axis of a sunny country garden, but could work equally well in a shady town garden.

Sculpture in the Garden

George Carter

It is a common misconception that the formal architectural garden typified by Le Notre in France and Bridgeman in England is only suited to the grand scale. Small formal gardens can be highly successful and are particularly appropriate in towns or where low maintenance is desired. One such garden devised by three sculptors and a horticulturist was shown at the 1985 Chelsea Flower Show. It was intended to make the most of a very small, enclosed site 20′ by 15′, and its whole effect relied on the organization of space and the modulation of light and colour. Various illusionistic devices were employed: The area, for instance, was divided into four axes by trellis-encased yew screens so that one could not take in all the effects at once. Specially made mirror glass giving the indistinct reflection of 18th century Vauxhall plate was used both in panels and in fake cascades to close vistas and to *conceal the bounds* (to use Alexander Pope's famous phrase). There were also distortions of scale, so that the grotto arch framed by the central vista was only five feet high both to make it seem further away and to give added height to the foreground columns which were only eight feet high. Similarly three-fourths inch gravel was used in the foreground and one-half inch in the background, while a smaller scale rue border was placed behind a larger santolina one to heighten the effect of perspective.

This garden can be seen as a piece of sculpture. In a less controlled small town garden an individual piece of sculpture can also take on a prime role. The first prerequisite is an efficient method of enclosure to exclude incompatible surroundings. Walls, hedges and trellis-covered fences, with or without climbing plants, form the sort of plain background that makes an excellent foil for sculpture.

Shiny or glittery materials are not nowadays much favored for gardens, though Francis Bacon in 1625 recommended *broad plates of round colored glass gilt* for hanging in arbor hedges. In the 1930s there was a brief revival of the use of mirror glass in the garden. Charles Moreux, for instance, used a silver sphere as a finial to a column forming the focal point of a garden. Robust interior silvered glass spheres were used in a scheme by Carter, Fulcher, and Tate at the Liverpool Festival, and in fact look very well in a variety of garden settings.

Materials

There are essentially two categories of material suitable for garden sculpture. One group—marble, glass, gilded and painted surfaces—resists weathering and patination and reflects light forming a lively contrast against plant material. The other group is stone, concrete, bronze, copper, lead, terra cotta and unpainted wood. These are tough materials that weather well, tone down and take on a new interest with patination.

It is important to consider color and to exploit the effects of patination. Various beautiful shades of green can be chemically and permanently induced on copper and bronze, an effect which bronze-filled resins cannot copy. Patinated copper in its various hues looks well against dark foliage or the bright green of grass. Surprisingly vivid shades of apple green and turquoise can have a fine effect in a shady situation. The mottled surface of a patina considerably increases the interest of plain surfaces. A copper

George Carter is the Exhibition Designer at the Sainsbury Centre for Visual Arts in Norwich, England. As a sculptor he has been working around the theme of the formal garden since 1970. In 1984 he was the joint winner of the Sunday Times *"Art for the Garden" competition and was one of the contributors to* The Oxford Companion to Gardens.

fountain by William Pye, small enough to be moved about, was shown on the balustraded terrace of a Harold Peto garden in Oxford, where it made an effective screen through which to view the garden.

Garden sculpture need not be thought of solely in terms of the single object in the round. A pierced screen visually linking two separate parts of the garden offers possibilities. Similarly an extended structure perhaps physically linked by rails could be used to articulate the space of the garden, forming its underlying bone structure in place of hedges or edgings.

Plaques and bas-reliefs too are useful elements, particularly in small gardens. They can emphasize axes or create focal points in informal layouts. They need not be fixed to walls or associated with architecture. In my own garden a lead plate engraved with a simple grid is attached to a wooden post or stela. Though very simple it forms a termination to a gravel walk. Lead patinates to whitish grey which looks well in a strongly lit position. It harmonizes with grey and silver foliage. Bas-reliefs in all materials should be placed in a sunny position to maximize their effect.

Choice of theme

How might one go about choosing a theme or subject for sculpture?

I can visualize delightful schemes based on the 18th century idea of consulting the *genius of the place;* that is determining the essential or underlying character of the site. Here again we return to the idea of mood in the garden. Even the smallest town plot has a character peculiar to itself; one has only to decide what it is.

A simple method to carry out this sort of scheme might be to devise a series of inscriptions on stone blocks placed at various strategic points in the garden. Short texts in a simple serif typeface engraved on vertical blocks, or slabs placed horizontally on the ground could, at moderate expense, be executed by a mason.

One way to stimulate the imagination might be to research the history of a few of one's favorite plants in the garden, and to write texts relevant to them which would be placed near the plant.

A wooden cut-out of a sheaf of corn on a plinth is inexpensive and easy to construct. It is effective at a distance against a simple background. Wooden cut-outs, sham bridges, figures or urns — though despised by some, were popular in the 18th century, when instant if ephemeral effects were more common in gardens. Charmingly gimcrack structures in painted plaster, timber and canvas occur in contemporary accounts and in the Rococo landscapes painted by Thomas Robins. Such objects have of course long since disappeared. Cut-outs can provide a useful way of testing out ideas destined for more durable materials, as well as forming cheap if short-lived objects in their own right.

These sorts of objects might need a certain amount of clear space adjacent to them though they need not be entirely isolated on an open lawn. They could look well placed for instance, at the front of a border, surrounded on three sides by planting which should not be too diverse in tone or of very mixed habit.

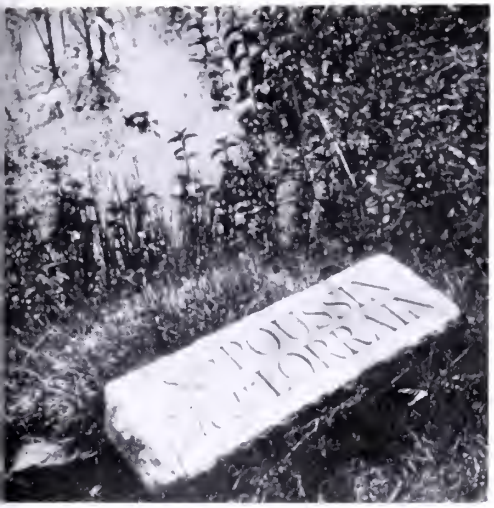
The kind of garden that is very unstructured with luxuriant foliage and chance effects can benefit greatly from a particular sort of minimal geometric sculpture. The often quoted reason for the success of the Sissinghurst Garden or the Lutyens/Jekyll partnership is a product of the same sort of interplay between rampant, flamboyant growth against the geometric structure of walls, paths and hedges.

Geometric shapes

Hard edged, sharply defined forms represent the antithesis of wild nature and therefore give the eye and the intellect a point of reference. Without this polarity a free-form type of garden can seem formless and meaningless.

A single white concrete block of slim vertical form perhaps four or five feet high (1-1.5m) placed in a prominent position rising out of foliage might provide the required contrast in a small garden. It need not be placed axially but should be positioned to balance the forms of foliage or ground contour.

If a pristine white marblelike surface is desired, a mix using white cement, white marble chips and silver sand is used, cast from a mould lined with a shiny plastic laminate. If a weathered appearance is desired, a cast stone with a pitted surface can be encouraged to patinate more quickly. Moss and mold grow best if the object is placed under the drip of trees or at least in shade. A spray of liquid manure, or a wash of watered down yoghurt speeds up the process. If one lives in an unpolluted



The poet and artist Ian Hamilton Finlay has arranged several tablets in his garden at Stonypath, in Lanarkshire and elsewhere. Often both witty and lyrical they are always pertinent to their situation.

Editor's note: Visitors to British flower shows will notice an abundance of garden sculpture in the exhibits. This is ample evidence of a resurgence of interest in its use.

atmosphere, lichens, though very slow, can be encouraged by gluing pieces from a similar substrate onto the object.

A more ambitious variant on the same theme of simple geometric shapes was shown at the Liverpool Garden Festival in 1984. Cast stone cubes, spheres, cones and pyramids can be assembled to form composite units or used individually. (Available in Britain from Empire Stone, Narborough, Leicestershire). They are inspired by the precisely clipped topiary of late 17th century and early 18th century formal gardens. Trees and shrubs so clipped represented an ideal of perfectly formed nature. The gardens they inhabited seem pure sculpture, perhaps pure architecture. The plants, walls, grass, gravel, and water articulate and compose outdoor space into a series of volumes, voids, and planes in harmonious relationship to one another. The notion that they also represent an ideal state of nature is not, to today's eye, apparent.

I visualize these geometric shapes used in a variety of ways. In a simple formal layout of grass, gravel, wall, fence or hedge they might be used as points of emphasis in the design. Four pyramids might mark the corners of a lawn or two composite units flank a gateway or mark the start and finish of paths. Even in the most informal setting paths and routes around the garden need an object or goal; an important role for sculpture. It need not be fully visible from every viewpoint, and in fact considerable interest can be generated from the notion of expectation and surprise. From various points it may be now hidden, now glimpsed, now fully seen. This can be devised in even the smallest garden by judicious planting.

In a less formal plantsman's garden, stone topiary might fulfill the "contrast" role previously described, or in symmetrical groups of two or four provide an underlying geometry or framework around which the planting is organized. Alternatively, two tall units might form a foreground frame through which an informal garden is viewed from the house.

Figures

I have not mentioned figurative sculpture, because not much that appeals has come to notice. The stone carver Simon Verity has, however, made a series of garden figures some of which can be seen at Barnsley House in Gloucestershire.

Elizabeth Tate showed a pair of chastely Neoclassical stone term figures, inspired by antique prototypes at Liverpool. The boldly simplified heads have bronze and lead detail. They are of a scale suitable for a small garden, and though at Liverpool were dramatically silhouetted against the sky, they might be placed to equal advantage in niches cut out of a hedge or against an ivy clad wall.

I have not attempted to distinguish between a self-contained piece of sculpture which stands on its own and the idea of the garden space itself as a sculptural concept, made up of a variety of elements which grouped together contain the same spatial excitement and harmonious relationship of volumes as an individual piece. Indeed I would argue that the latter process, though it offers the greater challenge, offers more scope and interest to the plantsman. It is however a complicated maneuver to orchestrate all the elements of the garden to a controlled whole. We have been urged by various writers to consider garden composition in painter's terms, but ought not to neglect the sculptural approach.

GROVE FARMS
ENGLISH PEARS

Aspects of the English Garden Grotto

Simon Verity

The combination of water and stone has always been a source of refreshment. As a seventeenth century Chinese writer put it 'Grottoes and tunnels are made which open upon the water. Here the moon peeps in and one can welcome the clouds'. Recent studies have shown how constant the theme remained until it's deterioration into the rockery.

A grotto leaves an unmistakable mark, a human imprint beyond usual garden thinking. It communicates on more than a visual level. Beautiful materials are combined with fine workmanship and a loving imagination.

A courageous new project is under way in Kent: a grotto in the Italian manner with a huge tufa stoneface gushing water within a sunken rotunda. It has high relief work in pebble and shell for the niches, architectural details in shiny anthracite and burnt white flint with a patterned pebble floor. This is a public setting, formal and elaborate, to introduce initiates to grottoes. Images of metamorphic figures in the underworld are revealed; the minerals and shells are laid in a tight mosaic with strong contrasting colors, textures and sizes clearly visible in our northern light.

Stout construction is essential for a much visited grotto and the Italians were masters at this. Stourhead is splendid in this respect, as the massive honeycombed masonry blocks are not merely foil for the delicate reclining goddess within the watery temple, but firmly resist damage and wear.

Painshill in Surrey is our finest grotto. Charles Hamilton, with the inspired collaboration of the doyen of grotto builders, Josiah Lane, took immense pains. Stones from Bath and Gloucestershire with the prized honeycombed texture were hauled a hundred miles to a bleak Surrey hillside. A winding lake was created and the huge stones were balanced vertically to make fretted turrets. From a distance the effect was of a ship hung from the sky. The inner shell was tiled with slivers of translucent gypsum arranged to catch glimmering reflections from openings to the lake. Nowhere has delicacy of texture been achieved on such a scale.

Another recurring theme is the grotto as refuge for poets and writers. Alexander Pope's grotto was a constant source of refreshment for him. Legends of Virgil in his grotto at Posilipo, Cicero in his at Mola, are based on actuality. The sensitive writer of today could well follow example.

The ability to allow materials to dictate, possibilities to grow, and the accidental to be used, can produce interesting results. The inspiration of Pope's grotto was far reaching. Thomas Jefferson visited it forty years after the poet's death.

Simon Verity is a well-known English sculptor and an inveterate lover of grottoes. He has written extensively on the reclamation of old grottoes and is currently at work at the Goldney Grotto where he maintains that the excitement of repair work rests with the discoveries made of what builders were wont to use, from horses' teeth to mineral fossils to kitchen middens.

Work in progress in the Goldney Grotto in 1984. The columns are covered with the mineral 'Bristol Diamond.' Approximately 10,000 shells and minerals are being replaced. This grotto, part of Bristol University, is now open to the public.

The engineer Andy Garnett was inspired to create an exquisite tiny grotto on discovering a large hole where a tree had decomposed. His thoughts are illuminating. 'Here you enter down a long tunnel which is curved and important to the whole. The floor echoes this act of penetration in pebbles. Local stone lines the walls which change in form from a sphere into a cylinder. With modern diggers the public works aspect can be done in a day and then the fun starts'. A shaft of light falls into this chamber with its crescent moon pond. Simple, profound, universal and unforgettable.' An area I would like to explore is sound in a grotto. There should be an aeolian trombone rising from the dense undergrowth above which would catch every movement of the wind which would be funneled down and make unearthly sounds in the chamber below'. His reason for building 'purely for pleasure'.

This grotto appears to grow from the very hillside and has a strong sense of place. Any grotto demands your involvement in a way true of no other part of the garden. Go through the gateway and a wand is waved over you; every sense heightened by fear, anticipation and wonder.

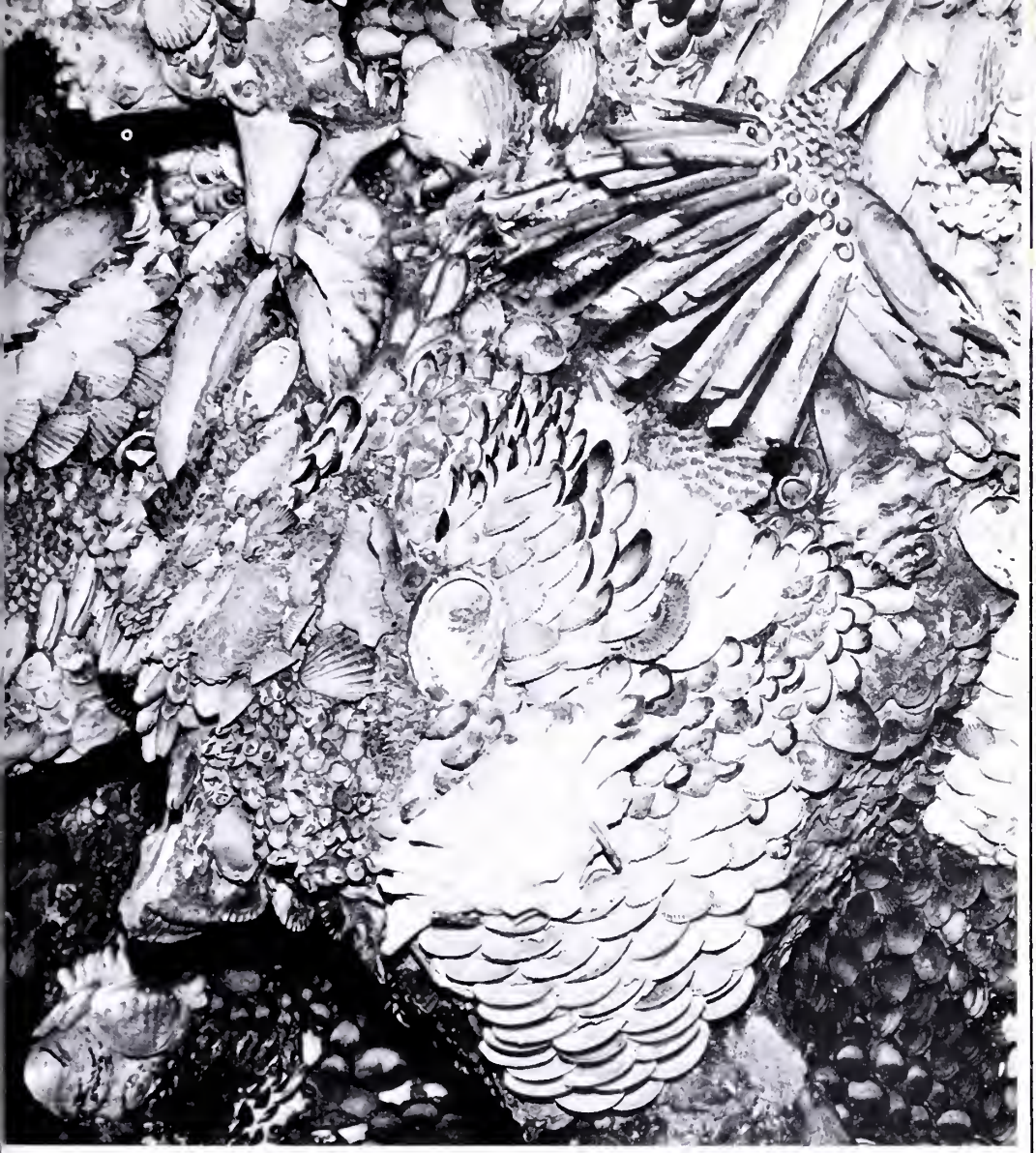
Eighteenth century understanding of materials is nowhere more exquisitely explored than in their grottoes. For them the natural world was being exposed in a most vivid way by voyages of discovery in Africa and the Pacific. Gems, curiosities of nature, shells and corals were brought back by travellers; incrusted on walls, laid on the floor, hung as stalactites from above. They were a vital contribution to the age.

The rich geology of England yields fine geodes and potato stones which when cracked open reveal magnificent quartz crystals. In the past these were closely fitted round columns presenting a glittering array of 'diamonds' under candlelight. The splendors of the English shell grotto are unparalleled. Their abstract forms refresh the eye, they can be fitted fairly quickly, and the potential kaleidoscope combinations of form, texture and color could delight a grotto maker for a lifetime. The variety possible in their arrangement is limited only by the imagination.

Eighteenth century detritus was a richer source than our own for the type of work they wanted to create. The blue and purple clinker from iron and glass furnaces is no longer produced; other industrial wastes are classed as toxic or are pulverized. They wanted the effect, described by classical writers, of rough textured caves. Bricks, overfired to melting-point, are still available from small brickyards but perhaps grottoes should reflect our own time more markedly. Grottoes made of compressed motor cars may not have restful connotations, but grottoists can find sources in industrial pressings, modern spun glass, the possibilities of lighting and easily pumped water.

The interaction of painters, writers and practical gardeners has always been profound. Young sculptors today are potentially a great inspiration. There is a growing affinity with landscape in their work. Andy Goldworthy's sculpture tied into the landscape is pointing the way. Huge woven bowers in living wood, arches made of broken sheets of ice, piled pebble sculptures by rivers.

The sculptor Arnold Machin placed on his grotto. 'I am in no hurry. Grottoes take time.' He built a wall and bank to get some height in a flat garden. Spiral steps take you from the top of the bank through a narrow passage of local Hollington stone which opens out into a rough cavern. There is an extraordinary combination of suffused light, delicate loving handling of the large stones, the concentrated view of the lake, wet shiny pebbles underfoot. The pond outside will overflow into an echoing pond within the cavern. 'It is important to have restrictions. The damming of water creates terrific force.' Within the restrictions he makes for himself there is real potential. 'I see grottoes as eternal. As I garden I pile up the pebbles that abound here. I didn't know they would come in useful but they have. They are so beautiful and each has a life of it's own so they are never thrown away. The cave was simple to construct. A few concrete blocks piled up, planks laid on with bits of wood fitting roughly to required shape and topped with sand. The stones laid in place from above, a little concrete spooned over and then sand and blocks knocked away. The stones themselves inform the way I work. I start with a sketch but it always develops and changes.' The stones have the stream of their lives diverted, but their intrinsic nature remains intact. There is an intimate relationship between a human and the



Banks of new British exotic shells amongst old work at the Goldney Grotto.

landscape effected through the medium of the material. 'I first saw the grotto as a more formal structure than it afterwards became. I will need to modify the austere brick piers and arch because they are no longer related to the rest. There must be unity.' Ideas for planting, water courses, and incorporating his own sculpture are still extremely fluid, affected by his changing understanding of his materials, light, and environment.

Thus the garden grotto emerges from a long sleep. The Duchess of Portland housed the fabulous Portland vase in her grotto at Bulstrode. The poet Su Tung-P'o was prepared to pay 100 gold coins for a 'water-modelled stone' in the eleventh century, and Lady Fane discovered that her grotto at Basildon had cost three times more than her house. But as John Woolridge wrote in 1677, of Grotto's 'It is a place that is capable of giving you so much pleasure and delight, that you may bestow not undeservedly what cost you please on it, by paving it with Marble or immuring it with Stone or Rock-work, either Natural or artificially resembling the excellencies of nature.'

Books On Garden Ornament

Garden ornamentation may be seen depicted in the frescoes of ancient civilization. In fact, through the centuries illustrations have given us proof that the desire to focus, emphasize, or enhance the garden scene is a strong tradition.

Elisabeth Woodburn

Decorations in gardens vary from flagstone walks to gazebos, from pink flamingos to monolithic granite sculptures, with a liberal sprinkling of pots and urns, fountains and fences, sundials and gazing balls. The form these fixtures take are a key to the art of their times. One has only to look at the elaborate designs of wrought iron furniture and fountains to identify it with the 19th Century.

A look at some books published on garden ornamentation—past and present—may inspire new thoughts on styles for today's gardens.

One of the recent works to receive much interest is *The House of Boughs* by Elizabeth Wilkinson and Marjorie Henderson. It is subtitled 'a sourcebook of garden designs, structures and suppliers.' It has a melange of text illustrations with an historic overview that helps to establish a period background. Other works giving illustrations of various types of garden ornament include Paul Edwards *English Garden Ornament* (London 1965); Daniel Foley's *The Complete Book of Garden Ornaments, Complements and Accessories* (NY 1972) and Peter Hunt's *The Book of Garden Ornament* (London 1974). The Hunt book has some 460 photos of 'ornaments, walks, trellises, pools, statuary, vases, steps' and an introduction by G.A. Jellicoe. Only the first of these titles is presently available in print.

No discussion of books on the overall subject can progress very far without mentioning the great work by Gertrude Jekyll. *Garden Ornament,* first published in London in 1918, is a source book of illustrations. Issued as a large folio (somewhat reduced in the current reprint), it shows the results of centuries of English concentration on beautifying their gardens. The 'Empire builders' gathered treasures from around the globe. The variety of illustrations on everything from steps to pergolas is so good that it inspires one to adapt from this wealth to enrich our own less sumptuous 'estates'.

Three U.S. titles from the Jekyll era give a taste of what was popular here. Phoebe Westcott Humphreys studied art and architecture at the Philadelphia School of Design and spent years of travel both here and in Europe. *The Practical Book of Garden Architecture* was published in Philadelphia in 1914. Besides the usual sections on garden ornament, she includes a chapter on ornamental windmills 'to give distinctive character to suburban places'. Mary H. Northend's *Garden Ornaments,* New York, 1916, contains some good photos of the gardens of the time which show a number with strong formal features. Loring Underwood's *The Garden And Its Accessories* was published in Boston in 1906. The photographs provide excellent details of features from a well sweep to a bee skep, among other accessories. These three books show clearly that U.S. gardens of this period were interesting and varied.

In addition to these general surveys of garden ornamentation, there have been other titles devoted to specific subjects. One of the most enduringly popular is the sundial. Alice Morse Earle wrote *Sun-Dials and Roses of Yesterday* in 1902 because a chapter in her "Old Time Gardens" had mentioned them and she had as a result many requests for 'more.' She wrote an interesting introduction to the many aspects of 'dialing' as it was called early on, covering sites and pedestals, gnomons, inscriptions. R. Newton and Margaret L. Mayall wrote a practical book, *Sundials, How To Know, Use, and Make Them,* published in Boston in 1938. Recent, practical works include A.P. Herbert's *Sundials Old and New Or Fun with the Sun,* (London 1967), in which the author shows how to construct or adapt a sundial for the correct time in various areas. Rene R.J. Rohr's *Sundials, History, Theory and Practice* was translated from the French and published in Toronto in 1970. Included are a number of illustrations of early dials and drawings to help illuminate the text which is aimed at the serious student. A modern

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Elisabeth Woodburn delights gardeners with old and new horticultural books at Booknoll Farm. She is a world traveler and a member of the Antiquarian Book Society and articles about her have appeared in both Horticulture *and* Garden Design.

French work — *Les Cadrans Solaires* by Jean-Marie Homet — Paris, circa 197—, is a tall volume of photographs of striking and unusual sundials. Among the older books which continue to hold an interest are Mrs. Alfred Gatty's *The Book of Old Sun-Dials,* London 1872, with several subsequent enlarged editions and T. Geoffrey Henslow's *Ye Sun-Dial Booke* (foreword by Beverley Nichols) issued in London in 1914.

Interest in garden sculpture has always been strong with many books devoted to the topic. Recent enthusiasm is exemplified by the catalogue *Fauns and Fountains: American Garden Statuary, 1890-1930* issued by the Parrish Art Museum, Southampton, NY to accompany a 1985 exhibit they staged. Two issues of the title, *Brookgreen Gardens: Sculpture,* by B.G. Proske have been published in Brookgreen, South Carolina—one in 1943; the other 1955. This garden contains the work of over 140 sculptors and gives brief biographies of each. Other books have been issued devoted to a single sculptor. One such example is *For Gardens and Other Places,* The Sculpture of Sylvia Shaw Judson, Chicago, ca. 1967.

Several works benefiting those who like to make their own adornments have come out in the U.S. A few of these which have been popular include Henry B. Aul's *How to Build Garden Structures: Grills, Terraces, Shelters, Arbors, Fences, Gates* which has some 200 drawings of details to supplement the text (published in 1950). Robert L. Behme did *The Outdoor How-To-Build It Book* in 1971 in which he included instructions for planters, window boxes, bird houses, furniture, steps & bridges, wall construction, decks and shelters. Another practical work on these same subjects is John B. Brimer's *Designs for Outdoor Living* issued in 1959. *Gardenwood Work* edited by Charles H. Hayward, 1961, is a practical manual covering many useful, as well as ornamental wood products, from garden tubs to trellises.

Fences and gates form another subject area for many books. The choice of works range from such modern instructions as the Sunset *How to Build Fences & Gates* to such astonishing examples of dedicated study as Carl F. Schmidt' *Fences, Gates and Garden Houses.* Starting in the 1920s, Mr. Schmidt began taking pictures and making exact measured drawings of the fast disappearing landmarks of New England and upstate New York. The book, which he published himself in 1963, is a legacy of the past. Another book, first issued in 1887 and reissued in 1974 also has a historic view. This is George A. Martin's *Fences, Gates and Bridges.* The modern reprint does not see fit to acknowledge its 1887 origin. A good example of continuity of interest in this subject is the earlier Thomas Parker writing *An Essay on the Construction, Hanging & Fastening of Gates* issued in 1801 with four detailed plates and enlarged in 1804 to six plates and almost double the text.

Old trade catalogues are an interesting source of illustration and description. Publications on such diverse aspects of garden ornamentation as *Concrete Pottery and Garden Furniture* by Ralph C. Davison (NY 1917) have practical advice and illustrations of what was then popular. Wrought iron has been the subject of a number of monographs in various languages. As water in the garden is a popular device, fountains, the building of bridges and pool making are represented. Dumbarton Oaks published *Fons Sapientiae* Reinaissance Garden Fountains with some interesting old illustrations; Mrs. Charles MacVeagh wrote *Fountains of Rome* (NY 1915) with descriptions and history of 21 fountains and engravings on wood by R. Ruzicka.

While the present day has many attractive and practical works on garden ornament, the great publications of the past are so outstanding that they merit the considerable trouble it takes to find copies to examine. Almost all are masterly examples of engravers who showed gardens in exquisite detail and the ornaments so necessary to the gardens of their time. Among these treasures look for Giovanni Battista Falda's *Le Fontane di Roma* published in Rome circa 1691 in four parts. The fountains of Frascati, the gardens and fountains of Estense as well as of Tivoli, are also covered in this folio volume of Baroque period engravings.

Le Labyrinte de Versailles by Charles Perrault, published in 1677, had 39 engravings of fountains representing the fables of Aesop by Sebastien Le Clerc (reprinted 1982 in Paris). Since none of these fountains exist any longer, the book is an important link to the history of this great court garden, the scene of so much pageantry.

Holland, blessed with fine engravers, good publishers, and above all, wealthy patrons of

gardens who wanted books about their displays, produced such beautiful works as J. Commelyn's *Nederlandze Hesperides* in 1676. Famed for its engravings of citrus fruits, it does not receive enough notice for its illustrations of the huge pots in which they are planted. Sometimes bound with this work is D.H. Cause's *Die Koninglycke Hovenier,* published the same year in Amsterdam. This, in addition to its many engravings of flowers, shows the gardens which feature elaborate fountains. Petro Schenk in the 17th Century did a series of suites of 16 plates of views of wealthy patrons' gardens. The ingenuity shown in these in giving interest and dimension to the flat Dutch landscape is a tribute to both gardener and engraver.

Belgium in 1583 and 1587 saw the publication of a work so beautiful that plates from it are reproduced in most garden histories. Hans Vredeman de Vries' *Hortorum Viridariorumque Elegance & Multipices Formae* can be found in a 1980 reprint done in Amsterdam. While hardly a substitute for the original, it can give an idea of the quality of the 28 folio engravings.

A work on elaborate garden ornaments by Schynvoets was developed for Peter the Great's Holland agent. This was *Voorbeelden der Luthof-Cieraaden* issued in Amsterdam in 1725. P. Decker's *Chinese Architecture, Civil and Ornamental* with its 36 engraved plates shows many aspects of the 'chinoiserie' sweeping Europe in 1759. In 1776, Le Rouge, in Paris, also anxious to be 'a la mode' published the first of the 21 cahiers of *Recueil des Jardins Anglo-Chinois* in folio folders. In all they contained almost 500 plates by the time the last one was published in 1790. The reprint of this whole work in Paris in a limited edition in 1979 made it possible to see it complete. Due to its long period of publication complete sets of the original are difficult to find.

Similar works published in Germany and Holland at the beginning of the 19th Century contain what appears to be the most comprehensive collection of garden furnishings ever issued. J.G. Grohmann's *Ideenmagazin,* Leipzig 1797-180—, followed by his *Neues Ideen-Magazin* in 1806 is a marvel of inventiveness. G. Van Laar produced *Magazin Van Tuin-Sieraden* in 1802 in Amsterdam. The books can sometimes be found with colored illustrations.

Two further works of the 19th Century cannot be overlooked in any discussion of books on garden ornament. Boitard issued a work first published as *Traite de la Composition de L'ornementation des Jardins* in Paris, 1825, which had 96 plates of figures. It was published a number of times subsequently under various titles ending up by the late years of the century as *L' Art De Composer & Decorer Les Jardins.* Its 1854 edition was titled *Manuel de L'Architecture des Jardins* and was reprinted as such in Paris in 1979. The plates have an imaginative gauntlet of ideas. The final work to be mentioned is a delight to all those who enjoy the Victorian era. Shirley Hibberd's *Rustic Adornments For Homes Of Taste* was first published in London in 1856 with a colored half title and six plates. It is a beguiling work which was subsequently republished in several editions with an added subtitle 'and Recreations for Town Folk, in the Study and Imitation of Nature'.

It would seem from this brief survey of some 400 years of publishing, that garden adornment has a secure spot in the garden world. Perhaps a study of this past will inspire some new designs to represent the 20th Century before it is too late to call them 20th Century inspirations.

A Catalogue Review

Peter H. Loewer

We've got t' love each brick an' stone from cellar up t' dome: It takes a heap o' livin' in a house t' make it home.

If Edgar A. Guest had ever written a poem about a garden, I'm sure his sentiments would have been the same as those above. He would have said that when it comes to the enjoyment of a garden, plants are not enough. Has anyone ever enjoyed viewing flowers while sitting on a pile of wet leaves or a damp, moss-covered bucket turned upside-down?

Obviously, the American entrepreneur has found a market for creature comforts--both

aesthetic and bodily. Suddenly, many mail-order houses are offering chairs, gazebos, statues, sundials and other items that were once limited to the carriage trade and found only on palatial estates.

The following firms represent the gamut in garden statuary and seating. Their catalogues are loaded with things—both practical and whimsical—that bring comfort outside, to the back yard and beyond. None of these firms sells portable telephones to carry while you dig, or radios to take into the shower while you wash.

American Sundials, Inc., brings the concept of time to the garden in the only way it should be admitted—by offering a number of attractive, solid, sand-cast bronze sundials of varying sizes (up to a foot in diameter), with trenchant homilies inscribed around the edge in raised letters, including "Time and tide tarry for no man" and "A clock the time may wrongly tell, I never if the sun shine well." They note that their dials are accurate to within approximately 15 minutes of standard time in the continental United States.

Clapper's garden catalogue lists many elegant items for the garden, including solid teak dining tables and chairs that can be left outside in any kind of American climate, plus Roman garden parasols (made in Milan) that conjure up visions of sundrenched quays and merchants selling sweet oranges and prawns. Clapper's also carries a line of Versailles-design planter boxes of mahogany that are coated with asphalt and lined with galvanized steel, as well as lead ornaments, including a 150-pound whippet and a 50-pound hare.

Erkins Studios has been in business since 1910, and for many years had a wonderful store and gallery opposite the Public Library in Manhattan. Life-size statues stood on lead fountains hidden from the rush of traffic; footsteps echoed from marbled floors. The gallery, now in Newport, Rhode Island, still offers contemporary and traditional fountains carved from Italian stone (many of which would hold far more than three coins) and a 10-foot-high, 12-foot-wide cast stone garden temple. For the gardener who would prefer something smaller, they carry well-crated articles of handwrought lead (the five-inch frog is a charmer), wonderful wall masks of Italian terra cotta and a *claire-voyee* of great beauty.

Florentine Craftsmen had been in Manhattan for over 50 years, but they, too, had to move. Their old galleries were lined with "three shell dolphin fountains," the "piper of the garden" and hand-carved stone figures of cupids and putti ready to gambol about the petunias and the pines. They still offer these favorites, as well as smaller items made of lead and stone for those gardeners with less to spend, plus a fine line of planters and urns, including a flower box with a shell motif that would grace any terrace.

Garden Concepts Collection is a potpourri of garden products. Their catalogue begins with a quotation by Frank Lloyd Wright: "Give me the luxuries of life and I'll gladly do without its necessities." In its pages you will find a Gothic bench with an ogee-pointed roof, a canvas tea tent, a life-size crane and a number of figures made of cast plaster, including a Caesar, which is covered with bronze-and-gold leaf patina; cheval, with a bronze patina; and Dionysos, also coated with bronze. A bust of Diane is also available with a faux bronze patina.

Imagineering, Inc., has decorated the rock-bound shores of Maine with Weatherend Estate Furniture of handcrafted teak and mahogany. It's a new line of outdoor tables, chairs and settees that has evolved from one set of English-style lawn furniture originally designed some 80 years ago for a Rockport estate. All of the curves in the furniture are cut from lumber (rather than steam-bent), and each mahogany piece is primed, sanded and sprayed with three coats of high-gloss enamel.

Kenneth Lynch & Sons, Inc., publishes a catalogue called *The Book of Garden Ornament,* 400 pages of which are devoted to the largest collection of garden furnishings in the country. There are raintrees of bronze that drip water into stone pools, copper cattail fountains and garden statuary, including a six-foot-high statue of Justice. They also sell a recasting of horses' head from the east pediment of the Parthenon. The horse is panting from the exertions involved in pulling the moon goddess, Selene, across the night skies in her celestial chariot. Reading this catalogue gives one a sense of the history of art and design in America over the past 80 years.

Robinson Iron's garden art calls to mind the glories of Central Park, the majestic statues of London, or the best homes of San Francisco. Many of their designs and patterns were in use before the Civil War and were cast for a number

of southern estates and municipalities. But even in their impressive collection—including a serpentine vase that depicts a mother bird protecting her young from an attacking serpent—there are smaller items, including urns and vases, that are perfectly suited to a small city garden or a country terrace.

Seahorse Trading Company represents the Haddonstone Collection, made in England of a special form of reconstructed limestone with a surface texture resembling that of Portland stone. If you really want the look of an English garden, try the Gothic urn and base in your back yard, planted with Martha Washington geraniums and trailing forget-me-nots. They also have a pool that comes in sections; you can buy four sections for a round pool, or only two if you would like to create a half-pool to set up against a wall. I'd love to set up a half-pool, complete with their lion's-head fountain, in the middle of my perennial border.

Southern Statuary & Stone supplies a number of animals made of lead for the smaller garden, including a pair of 3½-inch-high birds, a duckling (piped for water) and a 22½-inch-high English hare, all of which are accurately detailed and are posed in a lifelike manner. They also manufacture a cast lead light in the shape of a leaf, which is perfect for lighting garden pathways. It directs all of the light down toward the paths to avoid any irritating glare, and is unobtrusive by day.

Vixen Hill Gazebos is a firm that offers octagonal Victorian summerhouses in two diameters: nine and 12 feet. It is easy to imagine wandering to one of these gazebos on a moonlit night to survey the fireflies that dance about the shrubbery while sphinx moths look for nectar in the blooming lilies. Everything you need is included in the kits. These fine houses are made of kiln-dried western red cedar and feature roofs with cedar shingles. The kits even include 110-volt electrical wiring for the cupola light fixture, a useful feature when moonlight is scarce.

Wind & Weather carries sundials, but their forte is a large collection of weather vanes to top garages and garden tool sheds or, if you have neither, a pole in the middle of the garden. There is a duck by Maine sculptor Barry Norling, who works in hammered copper; a kinetic sculpture of brass and copper with steel ball bearings by Joseph Beran, who was born in Czechoslovakia and now lives in California; and a wide variety of charming animals that perch upon satin-black arrows. They even have a set of miniatures for doll houses, train sets or birdhouses.

Wood Classics, Inc., is nestled in the foothills of the Catskill Mountains, and handcrafts the true Adirondack-style chairs in mahogany or teak. Chairs are available as kits, which can be assembled with a Phillips-head screwdriver, or hand-finished by the manufacturer. Exposure to the weather only brings out more of the natural grain of the wood, which eventually ages to a silvery-gray patina, but the original wood tones can be maintained with regular applications of a wood dressing. Wood Classics also makes a small garden bench that can be left outside all year.

Mail Order Addresses

Send for the catalogues of the companies mentioned in Peter Loewer's article at the addresses listed below.

American Sundials, Inc., Dept. AH, 300 Main Street, Point Arena, CA 95468, Catalogue free.

Clapper's, Dept. AH, 1125 Washington Street, West Newton, MA 02165, Catalogue free.

Erkins Studios, Dept. AH, 604 Thames Street, Newport, RI 02840, Catalogue $4.00.

Florentine Craftsmen, Dept. AH, 46-24 28th Street, Long Island City, NY 11101, Catalogue $3.00.

Garden Concepts Collection, Dept. AH, PO Box 241233, Memphis, TN 38124, Catalogue $2.00.

Imagineering, Inc., Dept. AH, PO Box 648, Rockland, ME 04841, Catalogue $2.00.

Kenneth Lynch & Sons, Inc., Dept. AH, PO Box 488, Wilton, CT 06897, Catalogue $7.50.

Robinson Iron, Dept. AH, Robinson Road, Alexander City, AL 35010, Catalogue $3.00.

Seahorse Trading Company, Inc., Dept. AH, PO Box 677, Berryville, VA 22611, Catalogue $3.50

Southern Statuary & Stone, Dept. AH, 3401 5th Avenue South, Birmingham, AL 35222, Catalogue $4.00

Vixen Hill Gazebos, Dept. AH, Route 2, Phoenixville, PA 19460, Catalogue free.

Wind & Weather, Dept. AH, PO Box 1012, Mendocino, CA 95460, Catalogue free.

Wood Classics, Inc., Dept. AH, Route 1, High Falls, NY 12440, Catalogue free.

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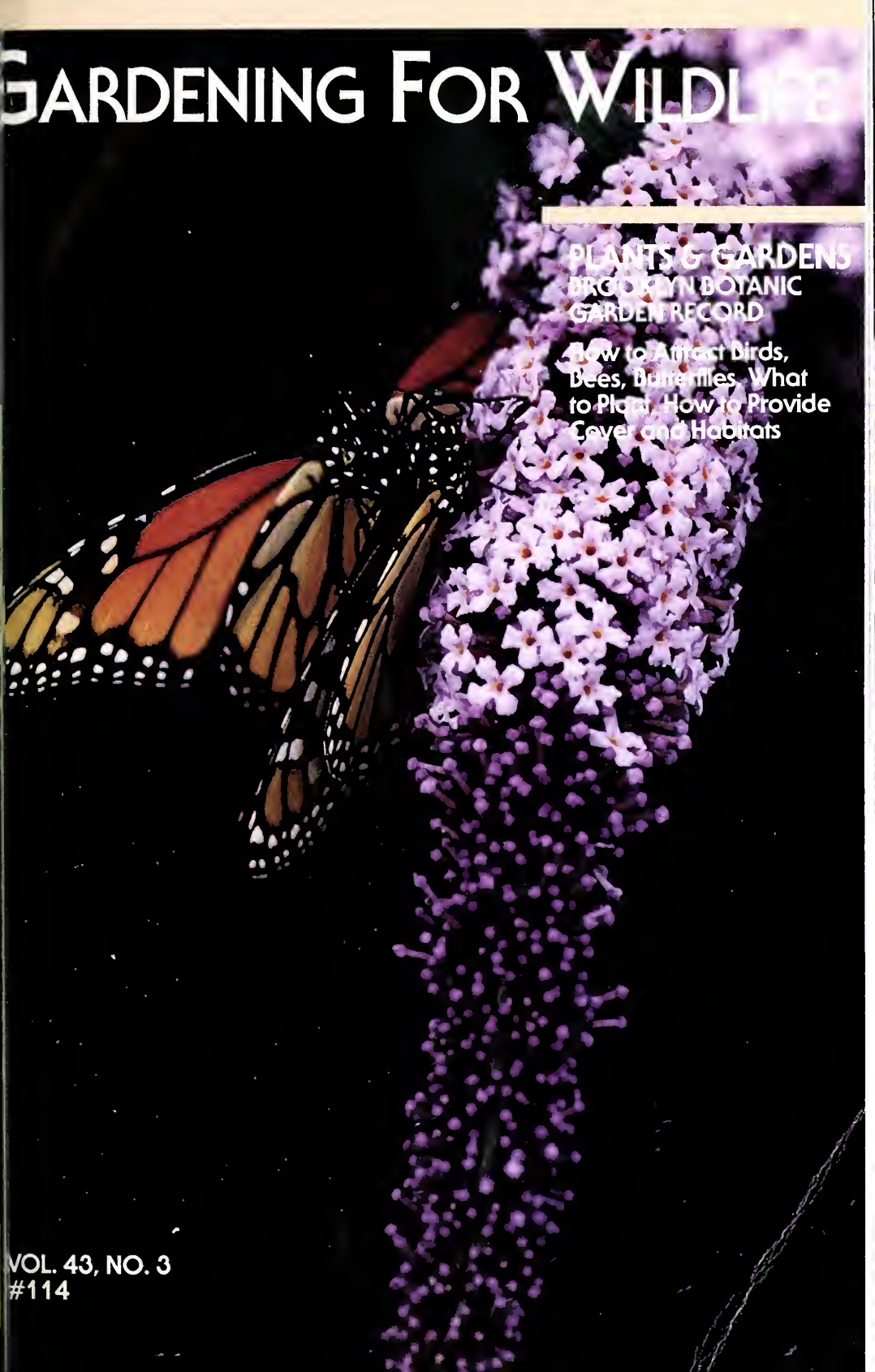
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PLANTS & GARDENS
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How to Attract Birds, Bees, Butterflies. What to Plant. How to Provide Cover and Habitats
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Gardening for Wildlife

1987

Brooklyn Botanic Garden

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PLANTS & GARDENS
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Gardening for Wildlife

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Cover photograph by Elvin McDonald
Buddleia davidii (Butterfly bush) and Monarch butterflies.

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foreword

In the course of assembling this handbook, I was amazed by the depth of feeling people have for the wildlife in their gardens. Not all the feelings are positive—one can hardly applaud the presence of deer sampling prized woody plantings. But today's garden community is more tolerant of garden wildlife overall as research reveals its benefits. Birds help control harmful insects, butterflies and bees are natural pollinators, and studies on the interaction between plant and animal offer new information in all sciences, including medicine.

The hazards from indiscriminately killing all insects with nonspecific chemicals and effectively removing the "good guys" as well as the "bad guys" are a prime research concern. Integrated pest management programs which call for precise knowledge, and studies on life cycles of plant predators, are finally reducing dependence on these chemicals.

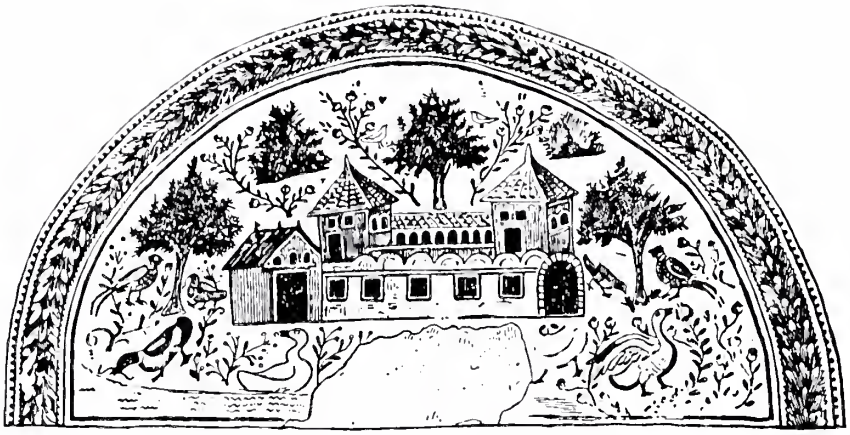
Knowledge of the intricacies of a plant's own chemical defenses against predators has opened a whole new world. It is now possible to consider the alteration of a plant's genetic makeup, endowing it with the ability to manufacture its own pesticide.

Our lives are enriched when we can learn to coexist in the natural world of our gardens.

SALLY TAYLOR

Pert black-capped chickadee visits feeder for sunflower seeds. These birds always add a note of cheer to the garden.

Garden with wattle fence, fruit trees, flowering plants, and grape vine. The usual fountain replaced by a statue on a pedestal. End of 15th Century.



An African-Roman Villa—a mosaic from the baths of Pompeianus

Wildlife in the Pleasure Garden

Sally Taylor

The very human attempt to attract and keep animals in garden-like settings is illustrated throughout history. From the earliest Egyptian tomb paintings depicting natural landscapes, animals have been shown. The flowering meadow of the medieval unicorn tapestries is populated with birds, rabbits, dogs and the mythical unicorn. The paradise gardens of Persia, the gardens of the Gods, the sacred groves of the Greeks and other such "pleasure gardens" are part of our cultural consciousness.

Marcus Terentius Varro (116-27BC), author of *Res Rusticae* described a Roman villa-garden with an aviary, or "ornithon." Additional features of the garden were fishponds and "hare-warrens," where rabbits were raised for the Roman market. Bees, snails, and birds were kept for both pleasure—"delectionis causa"—and profit. Varro describes, according to Thacker (1979), an outdoor aviary 18 by 72 feet, within which birds were confined by nets on either side of a dining area. While guests dined, birds sang for their pleasure.

Pliny the Younger (100 A.D.) describes frescoes of birds ornamenting the walls of his Tuscan villa, as well as a "hippodrome" or riding ground. Pliny the Elder wrote of a "verdant val-

Convent Garden of A.D. 1490, with raised banks running round the walls. Flowers are growing either in the beds or in pots placed upon them as well as on the ground.

Sally Lockett Taylor, guest editor of this handbook, is Associate Professor of Botany at Connecticut College and Director of the Human Ecology Program. She is the author of many papers and books and was guest editor of Plants and the Home Gardener, *a handbook published in 1984.*

Garden or Apiary surrounded and divided in two by a wattle fence.

ley," with a river flowing through the landscape and of the landscape "melodious with the choral songs of birds" (Thacker, 1979).

The nightingale was a favorite bird of Islamic gardens. It was paired in poetry with the rose, a flower native to the Middle East. Persian poets in the 12th century described soul-birds singing at the same time as roses opened, announcing spring; *praising the rose.* The rose bud was compared to the nightingale's heart. In Isfahan in 1598, Shah Abbas created a garden city with birds free or in aviaries amid closely planted trees.

Salomon de Caus, in *Raison des Forces Movantes,* written in 1615, describes the famous "owl and birds" statue of the Villa D'Este in Italy. During the 13th and 14th century in England, orchards with fishponds, aviaries and menageries were featured in the gardens of noblemen. Devices like talking owls and water surprises were constructed per directions given in the Arabic *Book of Mechanical Devices* written by al Jazari of Dyarbakir in 1206. The owl turns its head toward the birds, which stop singing, and when the owl looks away, the birds start to sing again. By cleverly using air and water pressure it was possible to imitate the songs of small birds. De Caus' brother, Isaac, designed at Wilton the first of the large formal gardens in England, with hunting parks, fishponds and aviaries.

Cattle and sheep became part of the extended landscape with the introduction of the ha-ha in the 1700s. A depressed ditch which animals could not cross, the ha-ha permitted large animals to be contained yet visible along the outer margins of the rustic landscape, thus replacing the walled gardens of an earlier era. In the gardens at Rousham, designed by William Kent in 1738, part and parcel of the landscape is a glorious dovecote, where birds nested. Eggs, birds and droppings were all useful to the farm operation and at the dinner table. It is today a working estate maintained as it was when the boundary wall between garden and field was breached.

In 1820 an octagonal Chinese aviary was constructed at Dropmore House, England. It had a raised dome where birds could fly freely. Humphry Repton, noted English garden designer, created a design for an aviary for the Royal Pavilion at Brighton in 1806.

In this century, Longleat was the first great English estate to return to keeping a menagerie as an income-earning device. One can visit the lions of Longleat, not to mention camels and monkeys as well. Here, too, Indian peacocks and peahens stroll the grounds uncaged. Also notable are the dolphin fountains of Chatsworth. Topiary animals of all descriptions still populate gardens in England and in the U.S. Topiary was perfected by the Romans; dolphin fountains were a feature of Renaissance gardens (as in the Villa Lante in Italy).

Old World civilizations did not originate the idea of animals in "gardens for pleasure." Hyams (1971) quotes Prescott's *History of the Conquest of Mexico* (1886), wherein is paraphrased a Spanish translation of an Aztec history, written by Iztlilxochitl. The palace garden of the Aztec king of Texcoco with its fountains, birds and fish is described.

. . . "birdhouse where the King of Texcoco in Mexico kept animals, reptiles and serpents they brought him from every part of New Spain, either alive or figured in gold and gems."

Cortez described another royal garden as being watered by aqueducts, divided into sections, and having "in one quarter an aviary, filled with numerous kinds of birds remarkable in this region for brilliancy of plumage and song" (Hyams, 1971).

Here in the United States, William Randolph Hearst assembled a collection of exotic grazing animals (including zebra) for the rolling hills of his mountaintop castle, San Simeon, in California.

Pigeon feeding in St. Marks Square in Venice or near the great mosques in Istanbul, or in Central Park in New York City, is yet another extension of the human urge to have animals in the landscape. Whether in town or country, we can indeed attest to much of the feeling which stirred in our forebears for "wildlife" in the garden.

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Editor's note: The woodcuts illustrating this article were selected from histories of herbals in BBG's special library collections.

"Garden of Love," with railed benches, from Der Meister der Liebesgärten, *A.D. 1450.*

How To Landscape For Birds

Stephen W. Kress

North American wild bird populations are facing frightening losses of habitat. Factors contributing to this loss are: the drainage of wetlands, fragmentation of woodland nesting habitats and deforestation of tropical wintering habitat. Even habitats "protected" in parks and sanctuaries may be affected by inconspicuous changes resulting from acid rain, or the introduction of such competitive birds as European starlings and house sparrows.

While many environmental problems may seem beyond your ready action, there are things which you can do for birds that will, at the same time, improve your own property or your community's parks. In this article we'll consider some of the positive changes you can make to assist wild bird populations.

The number and variety of birds occupying your land is determined by limiting factors. These factors include food, water, cover, nest sites and singing posts. Parasites, diseases and predators may also limit populations, but are generally not as critical. By careful manipulation of food, cover, water and nest sites, you can greatly alter the population of birds on your property.

Sometimes simply putting up a birdhouse or adding a fresh water source will be enough to bring wild birds onto your land. Providing food at feeders however, is rarely enough action to induce year-round increases in bird populations. You must also consider cover, nest sites and water supplies.

Often, the kinds of plants and the way they grow are the most important limiting factors. By careful selection and arrangement of bird-attracting plants, you can substantially increase the number and variety of birds which visit your property. Here are a few guidelines to help in assessing your property's potential *and* things to keep in mind when arranging new habitats.

Consider "edges"

Studies of wild bird communities demonstrate that where there are abundant "edges" between habitats, there will also be a greater variety of birds. This is because edges offer a mix of different foods and shelter. For example, where a hedgerow joins open lawn, foods are present both in the plants of the lawn (i.e., *seed* from crabgrass, sheep sorrel and clover), and from the hedge (i.e., *fruit* from privet, pyracantha, elderberry or sumac).

Each habitat also has different kinds of insects and other invertebrates, providing greater variety to natural food supplies. Furthermore, each habitat also provides different amounts of roosting cover and nest sites.

There are also "micro-edges" within each habitat. Hedges, for example, may consist of several kinds of shrubs that produce fruit at different times of the year. Each of these will have a somewhat different height, stem structure, location of fruit and foliage shape. Wherever different shrubs come together in the same hedge, they create a "micro-edge" that further alters the food, cover and nesting potential of the hedge. For example, hedges which contain both deciduous and coniferous shrubs provide more varied roosting and nesting opportunities than hedges composed of only one type.

Stephen W. Kress is a staff biologist for the National Audubon Society and an Associate at the Laboratory of Ornithology. His book is The Audubon Society Guide to Attracting Birds, *published by Charles Scribner's Sons.*

Where there are abundant edges between habitats, there will be a greater variety of birds. This is because a selection of foods and shelter is provided. Shown at right is BBG's Local Flora section—a haven for both migrants and year-round residents.

Edges between habitats change in both horizontal and vertical direction, so its important to consider two planes when attempting to improve your yard for birds. A yard with mixed height plantings of close-cropped lawn, wildflowers, ground cover, shrubs and trees will have more edges and hence more birds. Conversely, expansive uniform habitats, whether close-cropped land, thicket or forest will have a paucity of birds.

Layer Your Property for More Vertical Edge

One reason tropical rainforests have so many kinds of birds is because they've a number of layers—running from ground to highest canopy. These forest layers are connected by vines and a tangle of vegetation growing from large tree trunks. Each layer is like a floor in a tall apartment building, complete with resident plants, insects, frogs and birds. The same analogy holds for temperate forests and also applies to backyard planning.

Different layers help to meet the needs of birds. Birds seldom spend all of their time in one layer. Chipping sparrows, for example, feed largely on the seeds of low-growing plants such as crabgrass and clover, but they nest in shrubs from three to ten feet off the ground and sing from the highest trees in their territory. Such observations suggest that multi-level habitats will provide edges in a vertical direction and will better meet the needs of a variety of birds.

This idea is helpful in many habitat improvement situations. If you have forest on your property or tall trees growing from a bare lawn below, you can greatly improve the bird value of your woodland by planting mixed forest ground covers such as bunchberry or lowbush blueberries. Shrub and understory layers such as flowering dogwood or serviceberries will add more feeding and nesting layers to the woodland. Virginia creeper, wild grape, cat-brier and other vines should be encouraged wherever they become established. They add valuable food and nesting cover and help to connect the various layers.

Careful selection of different height plants also helps to create better habitats in a horizontal direction. For example, plant tall coniferous trees (e.g., spruce or pine) at the border of your property, shorter fruit-bearing trees (e.g., mountain-ash or flowering dogwood) in front of them, tall shrubs (e.g., elderberry, tatarian honeysuckle, or sargent crabapple as the next belt in the planting), followed by smaller shrubs (e.g., snowberry, coralberry or blackberry). Finally at the edge of the small shrubs, plant ground covers with bird-attracting value (e.g., creeping juniper, bearberry or crowberry).

Selecting Plants

Commonly used shrubs such as lilac, forsythia and azaleas have little value to birds. Instead, consider planting shrubs with both ornamental and bird-attracting value. Flowering dogwood,

Water, whether a pool, pond or birdbath, will attract a variety of birds to the backyard. Here a flock of robins bathe.

Photo by Hugh M. Halliday—The National Audubon Society (Photo Researchers, Inc.)

Flowering dogwood such as the Cornus florida *above provides color in the garden as well as cover and food for wild birds.*
Photo by Roche

honeysuckle, hollies and mountain-ash provide not only color, but cover and food for wild birds.

When selecting plantings for attracting wild birds, avoid exotics (plants native to other countries) in favor of native plants. Native plants have demonstrated ability to survive our climate and are unlikely to overrun other plants. Oriental bittersweet, kudzu, Japanese honeysuckle and multiflora rose are all vivid examples of "wonder plants" or exotics that became aggressive pests.

Editor's Note: A discussion of recommended North American ground covers, vines, shrubs and various-height trees for attracting birds is too vast a topic for this article. Let me refer the reader to this author's *Audubon Society Guide to Attracting Birds* (1985 Charles Scribner's Sons, New York).

Changes in Slope

Just as layering of vegetation is more attractive to birds, so too are changes in the slope of your property—especially where rock outcrops are exposed. Many ground-feeding birds such as wrens, towhees and white-throated sparrows are attracted to abrupt changes in slope. In natural habitats, these birds frequent stream banks, rock outcroppings, upturned tree roots and other unusual changes in slope.

If you have a new home and your yard is to be shaped by a bulldozer, protect irregularities in the contour of your property (such as natural outcrops of bedrock) by requesting the contractor to vary the slope of the yard where possible. Smaller scale changes in slope may be created by building a mound with a steep rock face or by creating rock gardens or stone walls. In northern climates, the steep surface of an artificial slope should face south so that the first spring thaw will reveal foraging places previously hidden by snow.

Hedges and different planting levels are a significant means of attracting a variety of birds to your property.
Photo by Roche

Providing Nesting Places

Properties with excellent food-production, cover and water may still not support their potential bird populations. There must also be adequate nest sites. Many perching birds—catbirds, thrashers and goldfinches—build their nests in tree or shrub crotches. Careful examination of the actual nest sites shows that most birds build where three or more branches emerge from about the same location on a main stem. This gives the nest maximum support. Pruning to create such nest sites may increase the chance of birds selecting your shrub(s) for their nests.

Dozens of North American birds, ranging in size from vultures to warblers nest in tree cavities. A dead branch or tree is a likely place for a natural tree cavity. Songbirds will use tall dead snags as singing posts while birds of prey sometimes use them to sight their next meal. With this in mind, it's important to preserve some dead tree snags on your property.

If you do not have conspicuous tree cavities, consider hanging nest boxes. The availability of suitable cavities is a common limiting factor; providing the right size nest box is one of the simplest things you can do to increase the number and variety of birds on your property.

Sacrifice Some Lawn for Mixed Ground Covers

A few birds, such as robins, grackles and flickers will feed in low-cropped lawns, but well-manicured yards are seldom visited by most birds. Where chemicals are used to control weeds or lawn insects, such yards may be a serious hazard to birds. A small patch of lawn has a useful place in a bird-attracting program as a focal place from which we can better see birds in more desirable habitats.

Many ground-feeding birds, such as towhees, thrashers and several native sparrows prefer feeding in leaf litter where they can scratch or poke for insects, earthworms and other invertebrates. A good place to create leaf-litter areas

is under trees or shrubs where grasses have difficulty growing. Such areas can even be expanded by several feet in front of shrubs. Rake leaves into these areas each fall and let them decompose over the winter. By spring, the decomposed leaves will create ideal conditions for earthworms and other natural bird foods. These leaf-litter feeders may be easily maintained with an ordered look by edging them with flush flagstone borders that do not hamper mowing.

Further ground cover improvements can be achieved by planting borders and patches of low-growing perennial plants such as bearberry, crowberry, and creeping cotoneaster. The fruit produced by these perennial ground covers makes them more useful to birds than some of the more conventional ground covers such as pachysandra, periwinkle and Boston ivy.

Backyard Water Supplies

Open water throughout the year is an important feature of bird-attracting properties. This is especially important in arid regions or in northern habitats over winter. The simplest way to keep water from freezing in birdbaths and small pools is to install an electric water heater. These are available from stores that sell bird feed or from poultry supply houses.

Even a small birdbath positioned on a pedestal (the kind available for a few dollars at any garden shop) will do wonders for attracting birds. Success will be greatly improved by adding movement to the water. A simple way to accomplish this is to hang a bucket with a hole in the bottom over the birdbath. This slow water drip is a simple, but proven way to lure birds to water. The variety of birds attracted by this simple technique is amazing—especially during migration when warblers and vireos join the more usual visitors.

Where space permits, an in-ground bird pool can be a delightful addition to your property. This can be a beautiful addition to a rock garden, especially if creatively landscaped with ferns and other low ground covers. The simplest way to build such a pool is to excavate a hole and line it with heavy black plastic. The contour of the slope is a key consideration; it should be no more than three inches deep and should slope gently on the sides.

A more permanent and natural-looking pool can be created using concrete mix. First excavate the site, digging about nine inches deep (six inches if you live in a non-freezing latitude), taking care to grade the sides at a gentle slope.

If you live in an area where soils freeze in the winter, fill the hole with several inches of sand to reduce the risk of frost heaving it in the winter. To give added strength to the concrete, cut a piece of welded wire (one by two-inch mesh) to fit the hole, pressing it down over the sand. Pour three inches of concrete mix over the wire so that it is buried inside the concrete.

Dust Bathing

Many birds bathe in both water and dust. House sparrows, quail, hawks and even tiny kinglets "splash" about in the dust, just as they would in water. The reasons for dusting are not clear, but it's likely a means of displacing irritating parasites such as feather lice. It may also serve to remove excess oil and moisture that would otherwise cause feather matting. Dusting areas are a means for luring birds into view. If you build a dusting bath, position it in a conspicuous place, far from cover that might hide predatory cats. Dusting birds seem especially oblivious to approaching predators.

Dusting baths may be as small as a foot square, but larger baths can accommodate more birds simultaneously. To create a dust bath, excavate a six-inch-deep depression and line the edge with bricks or rocks. Then fill the depression with a dust mix consisting of one-third each of sand, loam and sifted ash.

Food Patches

An easy way to produce more bird food and reduce the amount of close-cropped lawn in your yard, is to simply let some grain go to seed. Often wildflowers with bird-attracting value, such as thistle, black-eyed susan and clover will soon dominate such patches.

Studies of the stomach contents of wild birds consistently point to the importance of weed seeds as food. To create a natural food patch, all you need do is till the soil. It is likely that some of the most important wild bird foods will grow without even planting. The seeds of ragweed, amaranth, lambsquarters, sheep sorrel, bristle grass and panic grass are widely distributed in most soils—ready to germinate upon soil disturbance.

Depending on space, a wild food patch can be a 100 to 2,000 square foot patch of tilled soil. If

space permits, till three strips in rotation over successive years. Long, narrow patches are better than square plots, since they offer more edge. Mown walkways between the strips will give your natural food plots an orderly appearance.

Cultivated crops can provide a concentrated food supply over a short period. Cultivated food patches are easily grown by broadcasting a bag of mixed seed over freshly tilled soil. A 15 pound bag of mixed seed is enough to grow a half-acre patch of millet, milo and sunflower.

Like the grain dispensed from bird feeders, cultivated food patches are a short-term solution to bird food needs. Their use should be supplementary to other natural food supplies such as meadows, thickets and forests with their abundant bird-attracting vegetation.

Garden Flowers for the Birds

Just as some trees and shrubs have both ornamental and bird-attracting value, the same applies to garden flowers. When selecting flowers for your garden, keep birds in mind and choose some of their favorites. Most of the garden flowers recommended for birds are members of the sunflower family. Sunflowers (of all sizes) are especially attractive to goldfinches, sparrows and other members of the finch family.

Most of the flowers in the following lists will grow in moist, summer gardens throughout North America. With few exceptions, they require open, sunlit growing space. Garden flowers should be fertilized with one to two pounds of general purpose fertilizer per 100 square feet. Water, but do not soak and be sure to leave the flower heads on so that the birds can consume the ripened seeds in the fall and winter.

Selected Garden Flowers For Attracting Wild Birds

For Sunny Sites

Aster *(Aster spp.)*
Bachelor's buttons *(Centaurea americana)*
Blessed thistle *(Cnicus benedictus)*
Calendula *(Calendula officinalis)*
California poppy *(Eschscholzia californica)*
Campanula *(Campanula spp.)*
China aster *(Callistephus chinensis)*
Chrysanthemum *(Chrysanthemum spp.)*
Coneflowers *(Rudbeckia spp.)*
Cornflowers *(Centaurea spp.)*
Cosmos *(Cosmos spp.)*
Dusty miller *(Centaurea cineraria)*
Love-lies-bleeding *(Amaranthus caudatus)*
Marigolds *(Tagetes spp.)*
Phlox *(Phlox spp.* especially *P. drummondii)*
Prince's feather *(Celosia cristata)*
Silene *(Silene spp.)*
Sunflower *(Helianthus annuus)*
Sweet scabiosa *(Scabiosa atropurpurea)*
Verbena *(Verbena hybrida)*
Zinnia *(Zinnia elegans)*

For Sites with Light Shade

Basket flower *(Centaurea americana)*
Coreopsis *(Coreopsis spp.)*
Dayflowers *Commelina spp.)*
Sweet sultan *(Centaurea moschata)*

Landscaping for Hummingbirds

In the western United States at least 14 hummingbird species regularly visit gardens with hummingbird-attracting plants. Some western hummers, such as Anna's hummingbird, frequent backyards throughout the year. In the eastern United States and southeastern Canada, only the ruby-throated hummingbird occurs, but it is often very responsive to sympathetic gardeners. A dozen or more may swarm over a flowering tree such as mimosa or horse-chestnut.

Although hummingbirds are primarily nectar-eaters and obtain their liquid meals deep within flowers, they also eat large quantities of insects and spiders which they snatch from flowers. Planting flowers to attract hummingbirds provides the hummers with a two-course meal of nectar and insects.

You can attract hummingbirds to your garden by planting trees, shrubs or garden flowers with tubular shaped blooms. Hummingbirds prefer orange or red flowers, but they will also visit pink, purple, blue and even some white flowers. An important goal of any hummingbird garden should be to plant the flowers in large, conspicuous clumps and to select varieties that bloom from spring through late summer.

Based on the idea of layered vegetation, you can attract hummingbirds to your garden by building a multi-level display of attractive plants. On the south-facing side of your home or outbuilding, establish a tall, climbing vine such as honeysuckle, trumpet-creeper, scarlet runner

A natural pond not only adds water for birds, but interest and increased habitats for herons, ducks and geese. Pond-edge plantings can increase the diversity of habitats.

bean, or morning glory. Surround the vine with shrubs such as bush fuchsia or weigela or plant tall annuals such as zinnia and phlox. Shorter garden flowers; e.g. columbine or beebalm, are excellent choices for a border.

Another successful design for a hummingbird garden is to centrally plant a tree (horse-chestnut, red buckeye or mimosa) and to hang baskets of fuchsia from the branches. Plant several varieties of impatiens in the shade under the tree.

Plants for Attracting Hummingbirds

Northern Gardens

American Columbine *(Aquilegia canadensis)*
Beebalm *(Monarda didyma)*
Bugleweed *(Ajuga reptans)*
Butterfly milkweed *(Asclepias tuberosa)*
Cardinal flower *(Lobelia cardinalis)*
Coralberry *(Symphoricarpos orbiculatus)*
Fuchsias *(Fuchsia spp.)*, vines and shrubs
Hibiscus *(Hibiscus spp.* especially *H. syriacus)*
Hollyhocks *(Althea spp.)*
Horse-chestnut *(Aesculus hippocastanum)*
Jewelweeds *(Impatiens capensis* and *I. pallida)*
Larkspur *(Delphinium spp.)*
Madrone *(Arbutus menziesii)*
Ohio buckeye *(Aesculus glabra)*
Evening primrose *(Oenothera spp.)*
Siberian pea tree *(Caragana arborescens)*
Tiger lily *(Lilium tigrinum)*
Trumpet honeysuckle *(Lonicera sempervirens)*
Trumpet vine *(Campsis radicans)*
Zinnia *(Zinnia elegans)*

Southern Gardens (most from northern list are also appropriate)

Citrus tree *(Citrus spp.)*; low trees
Coral bean *(Erythrina spp.)*
Fire pink *(Silene virginiana)*
Lemon bottlebrush *(Callistemon lanceolatus)*
Mimosa tree *(Albizia julibrissin)*
Red buckeye *(Aesculus pavia)*
Scarlet runner bean *(Phaseolus coccineus)*
Weigela *(Weigela spp.)*

Bright Berries for the Garden, Food for the Birds

Photo by Roche

Snowberry (Symphoricarpos albus) *bears white berries into winter. A favorite shrub of 25 species of birds.*

Helen Van Pelt Wilson

Small trees and shrubs that hold their fruits through the coldest months offer fine color accents for the winter garden, and also food for the birds whose bright plumage sparkles in the cold air. Birds like the gray berries of the bayberry, as well as the darker blue fruits of red cedar, privet, and hackberry. However, these do not provide color for the garden and so may have to be omitted, except on very large properties, in favor of the brightest plants. Sumac, though also red-berried and favored by many birds, is too coarse a plant except for extensive wild areas.

The choice of really handsome red-berried material for winter seems infinite. Some of it, like the dogwood, is fairly familiar. Much of it, especially among varieties of hawthorn, euonymus, holly, and viburnum, is less well known. In the charts at the end of this article are plants that make an undoubtedly stunning collection, since all have been chosen for brilliance, hardiness, and long-season color effect. Some, like the barberries, actually retain their berries until the next year's blosssoms insist that they give way.

Aside from the sheer beauty of their fruit and the rich tones of early winter foliage, these are the trees and shrubs that attract the garden birds which devour the juicy fruits earlier in summer

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Helen Van Pelt Wilson has written more than a dozen books on such subjects as perennials, geraniums, flower arranging and home gardening. She is an internationally known editor and speaker.

Photo by Gottscho-Schleisner, Inc.

Mountain ash (Sorbus aucuparia) *is an outstanding fruiting ornamental enjoyed by up to 15 species of birds. It bears red-to-orange berries for a long season—August to February.*

and fall, and the dried, somewhat bitter ones last. In mild winters the birds leave many of these for the gardener also to enjoy, but in seasons of snow and stress, when normal food supplies are cut down to about two percent, they will feast even upon the enduring fruit of the firethorn.

In winter, in addition to berries, birds often feed on the "cones" of alders, birches, and sweet gums. When the wind strikes these, the seeds are blown out onto the ground to the delight of goldfinches and others. I like to see them worrying the tiny cones of the ancient hemlocks outside my windows. Woodpeckers, blue jays, and nuthatches come to my feeders, but they also eat the acorns of the pin oak. If you have a tall Colorado or Norway spruce, or a white or Scotch pine on your place, you will very likely see the birds eating their seeds and also welcoming the shelter of the evergreen branches.

Trees with Berries

It is often difficult to label some plants *trees* and others *shrubs*. Many kinds can be treated either way. It all depends on pruning. The simplest dis-

tinction is that a woody plant grown with one trunk is a tree, while a shrub has several or many main stems. So, considering their usual manner of growth, I select among berried trees the Washington thorn, dogwood, American holly, another holly, *Ilex decidua* (the possum haw), and the glorious mountain ash.

In any garden of less than an acre, where trees are wanted principally for shade, one of these might be given room for its bright fruit, and then, perhaps, one or more of the shrubby types can be added. Most of these berried plants are dominant growers, strong, lusty, and wanting room; they are particularly handsome when allowed a free range for their talents. Hence satisfaction is greater when they are used as prominent specimens and allowed to develop a natural, unpruned shape. You will notice that the berried crops are usually heavier in alternate years.

The Washington thorn, *Crataegus phaenopyrum (cordata),* is an amazingly beautiful tree, especially when seen under a blue October sky, with its scarlet foliage a background for a tremendous abundance of large, shiny red corymbs of fruit. These persist colorfully even into March, being among the last to attract the birds, which prefer softer and juicier fruit. Native from Virginia to Alabama and Missouri, the Washington thorn is hardy in New York and Boston, too, where it eventually reaches a dignified 25 to 30 feet. If there is room for it, this Washington thorn may be grandly planted in a driveway or boundary row.

The flowering dogwood, *Cornus florida,* is the special treasure of Philadelphia and Valley Forge, where the plantings are unusually massive and lovely. In one of my own early gardens, I had a treasured pair of shapely specimens planted beside a brick entrance walk. At no season were they anything but commandingly beautiful. In October the foliage turned a gorgeous crimson and the shining berries studded the branches for weeks into early winter (the number of weeks depending on the appetites of the birds—and also on the appeal of the fruit to squirrels, who can clean up a crop in a few days). More than 85 kinds of birds, the records show, look on the glistening red dogwood berries as item number one on their favorite menus. I gladly shared my crop with robins, cardinals, and others, since the fruiting season is but one of the attractions of the dogwood. Native from Massachusetts to Florida, and West to Ontario and Texas, this dogwood seems to have everything.

The American holly, *Ilex opaca,* is another general favorite, although it is planted less often than it might be because of a misapprehension concerning its manner of fruiting. Since this holly is dioecious (that is, with male and female flowers on separate specimens), two specimens must be included in a planting to ensure berries. The female tree may be prominently planted and the male—lacking conspicuous fruits, and smaller perhaps, but still an attractive evergreen—may be inconspicuously placed in the shrubbery border.

From the standpoint of berries, American holly is particularly desirable, because its glory is a winter matter. An evergreen, it dots itself with red in late November and at Christmas time becomes the very symbol of the season. Move it any time from fall to spring when the ground is not frozen, but preferably in early fall when the young wood has almost ripened, or in the spring before growth starts. The ideal location for holly is a partially shaded spot with protection from west wind. The soil must be well drained, acid, and preferably sandy. A three-inch mulch of peat moss is excellent, especially during the first year. Under such conditions the American holly will grow to 40 feet and endure with equanimity the rigors of even hard winters.

Ilex decidua is a gem of a small tree growing some 20 feet high. As the name indicates, it is not evergreen. Southern nurseries usually carry it, but in the North it is hard to find because it is considered tender—though this is not the case, since this holly has survived 17 degrees below zero in Philadelphia. Native from Virginia to Florida and west to Texas, *I. decidua,* thickly covered with large red fruits, suggests a cherry tree bearing its bright burden somewhat late in the season. Such is its form, although the bark is pale gray. It is definitely among the very finest of berried plants, beautiful enough to search for diligently. Self-pollinating, this holly is little trouble to grow and produces large, attractive fruit. Coming from swampy areas, it needs plenty of water.

The Bright Shrubs

Among the berried shrubs, there is another deciduous holly to consider, *Ilex verticillata,* the common winterberry or black alder. Native

to eastern North America, from Nova Scotia to western Ontario and Missouri, it grows some nine feet high and spreads to 15 feet, a superb plant at the height of its autumn grandeur. Like many hollies, it is dioecious, requiring both male and female plants for pollination. It is among our most adaptable natives, growing equally well in swampy or dry land, in sun or shade. Its shade tolerance is, of course, a valuable asset, since most of the berry-bearers demand the sun. The verticillata fruit is coral-red and thickly distributed along the stem. In October the yellow-green of the foliage turns bronze and really glimmers in the sun. In the Pennsylvania mountains it has earned the name fire bush. Birds do not immediately strip it as they may the dogwood, but by early winter the fire (fruit) is likely to be gone.

An attractive upright shrub for the edge of a woodland or the forefront of a mixed shrub border, the native red chokeberry, *Aronia*

Rosa rugosa *'Blanc Double de Coubert' pictured below is a thick growing plant which provides birds with good cover and winter protection. It is also a good candidate for seashore conditions.*
Photo by Roche

Photo by Roche

Juniperus virginiana *of dense, green foliage provides 39 species of birds with a good wintertime supply of food and cover.*

arbutifolia, offers a big crop of red berries that lasts well into winter, and if the planting is in the sun, the autumn foliage will turn a fine red to set off the crop of fruit.

The barberry family is famous for at least one variety, *Berberis thunbergii* or Japanese barberry. In trimmed hedges it will ever be pathetic to me, but planted either as a hedge or as a specimen where space is not limited and the pruning shears are withheld, it becomes something grand, with sparkling berries like ladies' earrings hanging in gay abundance from each blazing, foliaged branch. And these cling on to adorn the bare branches all winter long. Less familiar, and highly recommended, is the Korean barberry, *B. koreana,* handsome in foliage, in flower, and particularly in fruit, which also hangs in glowing clusters. The dense growth creates an impenetrable barrier.

Where a low plant is desirable, there is the rockspray, *Cotoneaster horizontalis,* one of two particularly handsome members of the cotoneaster group. It has flat, spraying branches, perfect for foaming over a low wall or hanging above a slope. It may even serve as a ground cover. Semievergreen in the North, evergreen and fruiting heavily in the South, this shrub endures hot, dry, sunny situations and puts on a beautiful September and October show by studding its branches thickly with a display of scarlet berries and orange-to-red foliage.

The firethorn, *Pyracantha coccinea,* especially the 'Lalandei' variety, is one of the most magnificent of the fruiting shrubs. It looks to me like an autumn-leaf bonfire that has got a little out of hand and is burning madly on just to please itself. The heavily clustered fruit is orange with all the brilliance of flame, and it may remain into late January. The ultimate height of the shrub is six feet and the spread is to 10 feet; grown as a vine it may reach eight feet in height. A well-grown specimen in the fruiting season is indeed a grand sight, but whether the birds will strip it early of its ornaments is a question. The claim is made for a September-to-March display in some areas that seventeen species of birds enjoy.

A shrub rose, *R. rugosa,* is a tall, "rough," spreading plant to grow outside the garden proper. I have enjoyed this plant set along the far side of a post-and-rail fence. The purple-red blooms of the rugosas open over a long period. The "hips," as the orange-red fruits are called, delight the birds. The dense growth of this species of rose offers winter protection as well as food and nesting sites in spring. This shrub rose

Editor's Note: Also see pg. 17 and pgs. 48-49 for charts on those plants that are particular favorites of hummingbirds.

grows well at the seashore. Today there are many hybrids and named varieties, with summer-blooming flowers in various tints of pink, crimson, yellow, and white; the habit of shrubby, thorny, year-round growth is invaluable.

The Japanese skimmia *(S. japonica)* has proved far hardier for me in Zone 6, where the temperature only occasionally falls below zero, than is generally claimed. Broader than it is high, this four-foot shrub produces fragrant spring flowers followed by clusters of scarlet berries that do not appeal to the birds until most other supplies are exhausted late in winter. Both male and female plants are required for fruiting, the male grown in an inconspicuous spot. I grew skimmias successfully in a somewhat shaded, northeastern location inside a stone wall that protected them from wind. If the temperature in your garden does not go below zero, the spectacular berried skimmia will be fairly safe and a handsome addition to your winter garden. You might plant the female shrubs for bright effect in front of the tall rhododendrons or azaleas that also require a somewhat acid soil and a good mulch. Another species, of recent introduction, *S. reevesiana*, grows to somewhat less height, is hardy to Zone 7, and bears perfect flowers, hence will be fertilized and produce fruits. The leaves are dull green but the berries are prolific in the fall and, in sheltered places, last even into January.

One shrub with white fruits, the snowberry, *Symphoricarpos albus*, is a treasure to lighten a shaded area. It is low-growing and excellent for the front of the shrub border where this passes out of the sun; the snowberry shows up well in early winter when the leaves have fallen and the white berries are silhouetted against the dark green of hemlocks or against a group of taller broad-leaved shrubs like mountain laurel or Japanese andromeda. I am glad to see that nurserymen are offering snowberries again.

Although the viburnum genus is chiefly famous because it contains the common snowball, it includes far more distinguished members. The high-bush cranberry, *Viburnum trilobum* or *americanum*, has long pleased both me and the birds. Extremely hardy even to Zone 2, this spreading native shrub offers clusters of bright red fruits all through winter. So, too, does the European cranberry, *V. opulus*, with vivid red, bitter berries that become transparent and also stay through winter.

Fruiting Vines

Four handsome vines produce winter-long berries but all four are for special situations. I grow the evergreen (really semievergreen) bittersweet, *Euonymus fortunei*, against the divider on the south side, also along the picket fence. This small-leaved vine grows to six feet fairly quickly here, but must reach greater maturity before it produces berries for a late-winter meal for the birds. It is one of the most attractive of the evergreen vines. (In the same genus, *E. patens* is not a vine but a grand hedge plant and fruits only in the South; *E. sachalinensis* is a great spreading semievergreen shrub with bright red fuchsialike flowers, effective where there is space for it.)

The Virginia creeper or woodbine, *Parthenocissus quinquefolia*, and Boston ivy, *P. tricuspidata*, are for house walls or old stone fences. Both have dark blue berries that have the advantage of hanging on through winter and appealing to many birds, but neither has the garden appeal of a red-berried shrub.

For the winter garden, trees and shrubs with bright berries are a fine sight, particularly in association with evergreens—and a nice light fall of snow. Plant your berry-bearers in good view of the house, where you can watch the birds enjoying the fruits. In time, Virginia creeper and Boston ivy will completely enframe the windows of a brick house, and thrushes, robins, finches and sparrows can often be plainly seen resting or pausing on the windowsill.

You can see in the chart that follows what wealth of attractive berried material you can select to decorate your yard or garden. You may have room for only one tree and, perhaps, three or four of these shrubs, for most of them require considerable space, but these are all plants that add to the beauty of the winter landscape as they attract the birds that in winter are colorful substitutes for the flowers of summer.

Trees, Shrubs, and Vines with Winter Berries

The length of time these plants hold their berries varies with their location, the weather, and the onslaught of the birds in some seasons. A flock may arrive to strip a plant one year and leave the berries on the same plant until spring another year. In the cross-references the most familiar common name is used, as Privet instead of Regel Privet.

NAME	ZONE*	HEIGHT IN FEET	BERRIES FOR BIRDS	COMMENTS
Aronia arbutifolia Red Chokeberry	4-9	9	Small, effective white flowers in spring; abundant fall crop of red berries lasting well into winter; spectacular red autumn foliage.	For moist or dry soil in light to deep shade; large, native shrub of irregular form.
Barberry, see *Berberis* Bayberry, see *Myrica*				
Berberis koreana Korean Barberry	4-9	4	Yellow flowers in mid-May; red autumn foliage, with pendent clusters of brilliant orange-red fruits that color in fall and hang on well into winter.	Thorny twigs; deciduous shrub with spreading, arching growth. A good substitute for *B. vulgaris,* which carries wheat rust.
B. thunbergii Japanese Barberry	4-9	4-5	Small white flowers in spring; berries strung along stems last through winter longer than those of any other shrub; scarlet autumn foliage.	Endures deep shade, dry soil; makes a prickly barrier or bank plant for sun or shade. Dependable even in worst situations. Variety 'Minor' is 12″ to 18″ with dense growth; good for low, red hedge.
Black Alder, see *Ilex* Boston Ivy, see *Parthenocissus* Cedar, see *Juniperus*				
Celtis occidentalis Hackberry	3-7	80	High, branching tree with seedy blue berries favored by at least 35 bird species.	Berries persist through fall, winter, and spring. Not for small properties.
Cornus florida Flowering Dogwood	4-9	25	Shiny red berries sought by 85 species through fall and early winter. Sometimes squirrels get there first. Crimson autumn foliage.	Handsome small tree with horizontal branches for open lawn or in the shade of other trees where there is shifting sunlight. Prune flat or let droop gracefully toward the ground. Needs deep watering in drought.
C. kousa Japanese Dogwood	5-8	20	Smaller dogwood with fleshy pink-red fruits resembling strawberries; nice to have both dogwoods.	Bushy growth, very shade-tolerant; blooms 3 weeks after *C. florida.*
Cotoneaster horizontalis Rockspray	4-9	3	June flowers followed by red fruits; more prolific in warm areas; semievergreen.	Horizontal branching makes this valuable for foaming over walls, training as an espalier, or use as ground cover.

NAME	ZONE*	HEIGHT IN FEET	BERRIES FOR BIRDS	COMMENTS
Crabapple, see *Malus*				
Cranberry Bush, see *Viburnum*				
Crataegus phaenopyrum (cordata) Washington Thorn	4-8	25	Rounded thorny native tree with red berries to please 33 species in winter if robins and cedar waxwings do not strip tree first; scarlet autumn foliage.	One of the last hawthorns to bloom; more spectacular in winter fruit than in spring flower. Fruit so heavy it looks like a second blooming. Avoid proximity to junipers because of rust. Deep rooting; tolerates shade. Good city tree.
Dogwood, see *Cornus*				

Malus *'Red Jade' is a weeping crabapple tree that is often covered with small brightly-colored fruits that attract many birds. This crabapple was developed by BBG.*

photo by Gottscho-Schleisner, Inc.

NAME	ZONE*	HEIGHT IN FEET	BERRIES FOR BIRDS	COMMENTS
Euonymus fortunei 'Vegeta' Evergreen Bittersweet	5-9	20	Bright orange fruits often in good condition from winter into spring; birds finally eat them.	Really semievergreen; can be trained as vine or left unpruned as a shrub that piles up its horizontal branches. Plant all in semi-shade to avoid scale.
E. kiautschovica (patens) Spreading Euonymus	6-9	7	Green-white flowers; early Sept. in South; late pinkish or red fruits where growing season long enough.	Handsome spreading evergreen for North but without fruits there. Good hedge plant.
E. sachalinensis (planipes)	5-8	12	Bright crimson fall leaves; large, pendent bright red fruits like fuchsia flowers hang in profusion on into winter.	From northeast Asia and Japan, a semievergreen shrub spreading to 12′ Interesting for unusual and abundant fruits.
Evergreen Bittersweet, see *Euonymus*				
Firethorn, see *Pyracantha*				
Hackberry, see *Celtis*				
Holly, see *Ilex*				
Ilex decidua Possum Haw	5-8	20	Bright orange-red berries held well into winter, often longer.	Southeastern native deciduous tree with lustrous foliage. Self-pollinating, needs plenty of water.
I. opaca American Holly	5-9	40	Favorite with 45 species for red berries well into Feb. and dense protective foliage.	Spectacular native evergreen tree, bushy or pyramidal. Male tree is essential for pollination but can be small and unimportantly placed. Hollies endure quite damp situations and prefer partial shade.
I. verticillata Winterberry or Black Alder	3-9	9	Large deciduous holly. Bright red berries for early winter for 22 species.	A shrub with a 15′ spread. Best in acid soil. Also a dwarf variety to 3′ tall with very large berries.
Japanese Dogwood, see *Cornus*				
Juniperus virginiana 'Canaertii' Red Cedar	2-9	10	Abundance of bluish berries and dense, dark green foliage supply both food and winter cover for 39 species throughout the winter.	Pyramidal, slow-growing form of native red cedar; excellent specimen for full sun, drought-tolerant. Makes a good evergreen hedge, but not as effective in winter garden as redberried shrubs, except as back-line for small gardens.

NAME	ZONE*	HEIGHT IN FEET	BERRIES FOR BIRDS	COMMENTS
Ligustrum obtusifolium regelianum Regel Privet	3-8	4-5	Most graceful of privets; birds delight in the blue-black berries and winter protection of twiggy horizontal branches.	Small glossy leaves; plants withstand city conditions; hardy in light, not deep, shade.
Malus 'Dorothea' Crabapple	4-8	25	Semidouble pink flowers in May; yellow fruits from fall to early winter.	One of very few double-flower crabapples to produce ornamental fruit; attractive tree for small property.
Mountain Ash, see *Sorbus*				
Myrica pensylvanica Bayberry	2-8	6	Abundance of waxy, gray berries favored by at least 73 species.	Rangy, semievergreen shrub, aromatic foliage; for light or deep shade; tolerates poor soil, some dampness, good for seacoast.
Parthenocissus quinquefolia Virginia Creeper or Woodbine	3-8	50	Rambling native vine with fine fall color and a wealth of blue-black berries that hang on to Feb. for 37 species.	Vines usually grown on house walls but also makes pleasing covering for New England stone fences; has 5 large leaflets.
P. tricuspidata Boston Ivy	4-8	50	Glowing scarlet autumn foliage; dark blue fruit hardly visible until leaves fall, then decorative until late winter.	Boston ivy has 3 leaflets (same as poison ivy); not to grow against wood. Will reach the top of a 3-story house. Birds may nest in the woody growth.
Possum Haw, see *Ilex*				
Privet, see *Ligustrum*				
Pyracantha coccinea Firethorn	5-8	6-8	Inconspicuous but charming white spring flowers; gorgeous orange-red berries all winter unless stripped early; enjoyed by 17 species.	Grown as a broad shrub or tall trellised vine; needs full sun or early morning sun, protected location; almost evergreen. 'Lalandei' choice variety.
Red Chokeberry, see *Aronia*				
Rhus typhina Staghorn Sumac	3-8	15	Heads of dark red berries delight some 93 species and last Sept. –May.	Not for limited areas; coarse but spectacular for a grove. Stiff not graceful growth.
Rockspray, see *Cotoneaster*				

NAME	ZONE*	HEIGHT IN FEET	BERRIES FOR BIRDS	COMMENTS
Rosa rugosa Rugosa Rose	3-8	5-8	Dense, spreading with a wealth of orange-red fruit, called "hips," that birds flock to; thick growth makes fine winter protection and nesting sites. Well suited to seashore conditions.	Long season; purple-red blooms and cultivars with white, pink, and yellow flowers. 'Frau Dagmar Hartopp,' a smaller white-flowering plant, also produces rose hips that please the birds.
Rose, see *Rosa*				
Rowan, see *Sorbus*				
Skimmia japonica Japanese Skimmia	7-8	4	Fragrant white flowers in spring; bright red berries, bitter-tasting, left by birds till last.	Handsome evergreen; male pollinator necessary for fruiting. Hardy for me in Zone 6, grown next to a protecting stone wall.
Snowberry, see *Symphoricarpos*				
Sorbus aucuparia European Mountain Ash or Rowan	2-7	45	Flat white flower clusters in May–June; glowing bright-red-to-orange berries Aug. – Feb.; 15 species enjoy them.	Handsome tree for moist to dry soil in sun. One of the most outstanding of fruiting ornamentals.
Sumac, see *Rhus*				
Symphoricarpos albus laevigatus Snowberry	3-9	2-5	White-berried shrub effective in front of evergreens or other tall plants; large fruits last into winter and are favored by 25 species.	Makes a good thicket in deep shade; may bend to ground when weighted by fruit; thrives in dry soil. 'Mother of Pearl' hybrid with pink berries.
Viburnum opulus European Cranberry Bush	3-7	12	Dense growth; orange-to-red autumn leaves; vivid red, bitter berries that become transparent as they stay on through winter.	Effective massed for color of white May flower and red fruits; stands dryness and heat. 'Compactum' to 5'; 'Xanthocarpum' with yellow fruits.
V. trilobum (americanum) American Cranberry Bush or High-Bush Cranberry	2-5	10	Spreading native shrub with clusters of glossy scarlet berries that hang on through winter; food for 34 species.	More cold-tolerant than most viburnums. Effective winter shrub especially in snow. Oval berries first yellow on one side, red on the other, then all red.

Virginia Creeper, see
Parthenocissus
Washington Thorn, see
Crataegus
Winterberry, see *Ilex*
Woodbine, see *Parthenocissus*

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* *Ed. note: The zones apply to the USDA climate zone map.*

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Firethorn (Pyracantha coccinea) *is a favorite food for 17 species of birds.*

Photo by Roche

Attracting Cavity-Nesting Birds To Gardens And Woodlots

Robert A. Askins

Many natural features that attract birds are easy to work into a garden. Water, dense shrub cover, and berry-producing plants can be used in a number of different landscape designs. Few such designs can easily accommodate dead and dying trees, however, and these are crucially important to a large number of bird species. Snags and dead branches provide sites for nesting, roosting and feeding. In Canada and the United States 85 species of birds nest in cavities in dead trees or branches,[1] and approximately one-fourth of the forest-dwelling mammals and birds in the Northeast depend upon dead trees for den or nest sites.[2] A manicured garden or a "well-managed" woodlot will lack these species unless there is a wilder area with dead trees nearby.

Use of Dead Trees by Birds

Birds that nest in cavities can be divided into two groups: primary excavators, birds that dig out cavities in wood, and secondary users, which use abandoned holes of primary excavators or cavities resulting from decay. Woodpeckers are the most important primary excavators because they can dig cavities in hard, dead wood or even in living branches which have a soft, decayed heartwood. These cavities are much more suitable as nest sites than most natural cavities because they have a small entrance hole surrounded by sound wood that is not easily penetrated by raccoons and other predators. In contrast, chickadees, which are also primary excavators, dig nest holes in soft, rotten wood. Eastern deciduous forests typically have four to six species of woodpeckers that make cavities of different sizes. Many species of secondary users, such as American kestrels, screech owls, tufted titmice, tree swallows, house wrens and eastern bluebirds, commonly nest in cavities made by woodpeckers. Secondary users sometimes take over recently completed woodpecker cavities, forcing the woodpeckers to build another cavity.[3] Starlings are especially adept at doing this. Secondary users can benefit from the building efforts of woodpeckers even when they do not take over their nests because each pair of woodpeckers builds a new cavity every year, probably to escape the nest parasites that infest old nests. A dense population of woodpeckers will therefore provide a continual supply of safe, abandoned nest holes that will support a diversity of other birds. Woodpeckers generally cannot build in living wood, however, so gardens and woodlots where snags are removed and unhealthy branches are pruned will not support nesting woodpeckers.

Secondary users are not completely dependent upon woodpeckers. They can also use natural cavities resulting from decay. White-breasted nuthatches prefer to nest in such tree hollows and brown creepers typically nest under loose bark on dead trees. These sites are scarce when dead trees and branches are systematically removed; in Europe it has been shown that hole-nesting species are much more abundant in unmanaged forests than in highly managed forests.[3]

Many species of birds depend upon cavities

Dr. Robert A. Askins is Associate Professor of Zoology at Connecticut College. He is the author of numerous papers on fluctuations in breeding bird populations caused by isolation of habitats.

At left is pictured a pileated woodpecker. These birds prefer to nest in dense forests but are adapting to human encroachment and seem to tolerate disturbed habitats. Their main food is carpenter ants in rotting trees and stumps.

not only during the breeding season, but also during the winter. These cavities provide a safe refuge from predators and protection from wind, precipitation and cold. Chickadees, nuthatches, creepers, bluebirds, wrens and woodpeckers all spend winter nights inside cavities. The temperature inside a cavity can be substantially higher than the outside temperature[5] Birds spend more time in the winter inside their cavities than outside (winter nights are longer than winter days), so the extra insulation provided by the wood around a roost cavity is important for survival. Each woodpecker makes a cavity for roosting, and individuals sometimes construct two or more of them. Hence roost hole digging is another way in which woodpeckers increase the number of cavities available to other animals.

Woodpeckers sleep alone in their custom-built roost cavities, but many other species use old woodpecker holes or natural cavities more effectively by roosting in groups. When large numbers of individuals of the same species cluster together, the cavity provides both insulation and a source of warmth. Communal roosting has been reported in nuthatches, chickadees,

House wrens will nest in boxes when provided. They are very social birds and seem to enjoy nesting in suburban communities. Their bubbling song is sufficient reward for providing the nesting site.

Photo by Hal H. Harrison—The National Audubon Society Collection (Photo Researchers, Inc.)

The Birds, Bees and Butterflies

Female cardinal perches on berry and snow laden branches of black alder (Ilex verticillata).
Photo by Thase Daniel– (Bruce Coleman, Inc.)

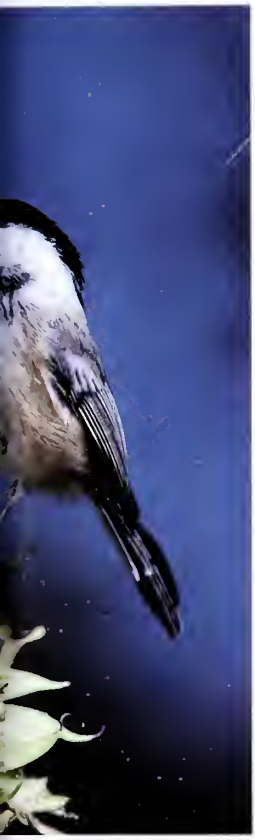
Bee gathers nectar from the flowers of goldenrod (Solidago sp.)
Photo by Paul Frese

Below *Borders backed by shrubs and trees provide edges and diverse habitats for many species of wildlife. In the foreground* Aster *x* frickartii *is intermixed with Pinocchio rose.*

Photo by Paul Frese

Below right *Black-capped chickadee perches on the top of a sunflower picking out seeds.*

Photo by Gregory K. Scott—The National Audubon Society (Photo Researchers, Inc.)



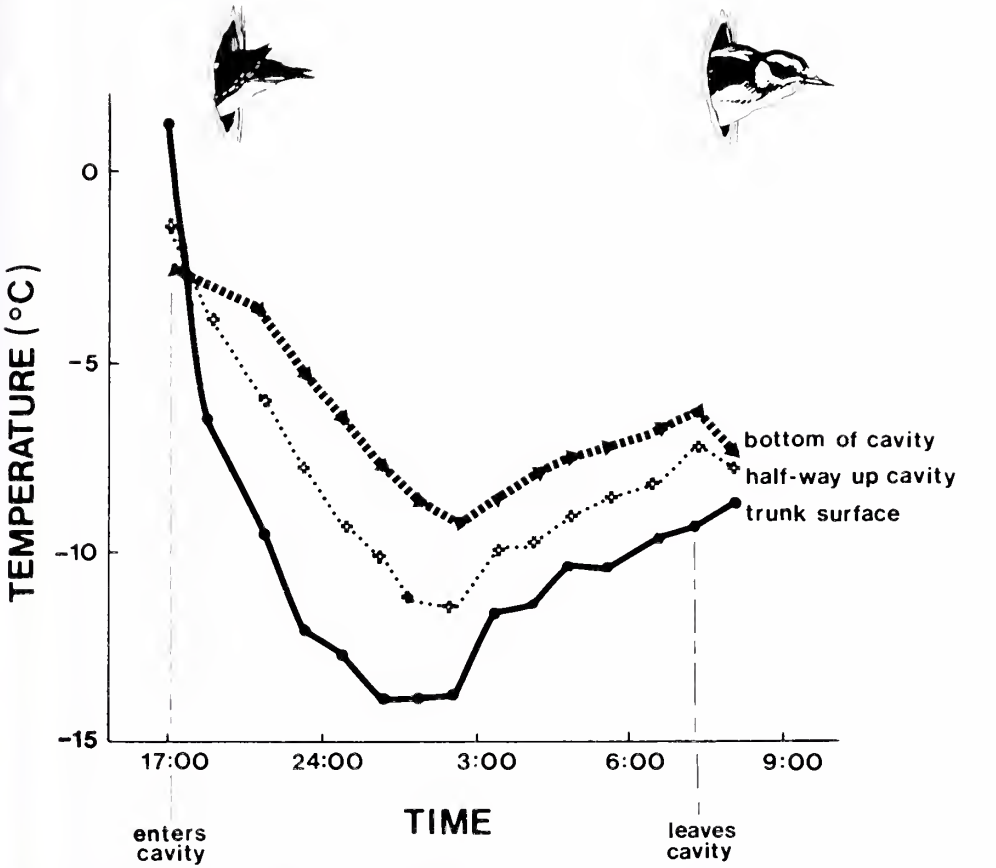
Top right *An American painted lady butterfly matches and contrasts with the zinnia on which it has alighted.*
Photo by David Overcash—(Bruce Coleman, Inc.)

Left *An Anna's hummingbird visits the brightly colored flower of double-flowered hibiscus seeking nectar.*
Photo by Bob and Clara Calhoun—(Bruce Coleman, Inc.)

Top *A male evening grosbeak feeds on crabapples. During the winter months, these birds often travel in flocks.*
Photo by Gregory K. Scott—The National Audubon Society (Photo Researchers, Inc.)

Middle *The brilliant orange flowers of butterfly weed* (Asclepias tuberosa) *attract many species of butterflies.*
Photo by Paul Frese

Bottom *Feeders provide birds with food in the winter months when food is often scarce. Here a blue jay visits a snow-covered feeder.*
Photo by Harry Hartman—(Bruce Coleman, Inc.)



Above illustration shows changes in temperature in the roost cavity of a hairy woodpecker during a February night in Minnesota. Temperature probes were inserted through small holes drilled to the bottom of the cavity and half-way up the interior. The maximum difference in temperature between the bottom of the cavity and outside was 7° C(12° F).

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creepers, winter wrens, and eastern bluebirds.[5]

Removal of dead and dying wood not only eliminates nesting and roosting sites, but also destroys a substantial food source for birds. Dead trees and branches have a rich supply of bark insects and wood-boring grubs that are important to many of the species that overwinter in the temperate zone. Creepers, nuthatches and chickadees subsist on insects and spiders extracted from crevices and cracks in the bark. Woodpeckers dig below the surface of the bark to extract grubs that bore through dead and decaying wood. My own research on woodpeckers in Minnesota and Maryland shows that three species (downy, hairy, and pileated woodpeckers) spend more than 50 percent of their feeding time on dead trees and branches. Thus removal of dead wood is a triple blow for many forest birds; they are deprived of nest sites, winter shelter and an important source of food.

Substitutes for Dead Trees

Because secondary cavity users, such as wood ducks, tree swallows, tufted titmice, house wrens and bluebirds, will readily use nest boxes, a generous supply of nest boxes of various sizes can substitute for natural cavities when dead trees have been removed. Large numbers of bird boxes successfully sustain populations of pied flycatchers and other hole-nesting birds in highly managed European forests.[3] For example, installation of large numbers of boxes in two coniferous forests in southern Finland increased the total number of breeding pairs of pied flycatchers from 3 to 137 in one year.

Primary excavators are more difficult to accommodate when dead trees are absent. Chickadees will nest in boxes, particularly if the box is filled with sawdust so that they must excavate a cavity, but woodpeckers do not accept nest boxes. Alan Peterson and Thomas Grubb, Jr. have recently developed artificial snags in an attempt to provide alternative nest sites for woodpeckers[6] They use polystyrene "bead board" cylinders painted with brown latex enamel. The cylinders, which are about nine inches in diameter and eight feet tall, are supported by metal fence posts. Downy woodpeckers readily built roost cavities in the cylinders and some secondary cavity users (Carolina chickadees and house wrens) nested in some of these, but the woodpeckers did not use them for nesting. Woodpeckers tap near the nest entrance during courtship displays, so the absence of a resonant surface may have disrupted their breeding behavior. This could be easily rectified by placing a small strip of plywood near the top of the cylinder to serve as a sounding board[6] A potentially more serious problem is that a large number of cavities in the cylinders were damaged by raccoons, indicating that the bead board may not provide adequate protection from predators. With further refinement, however, artificial snags may provide alternative nest sites for woodpeckers. Eight-foot tall plastic cylinders might not fit well in every type of garden, but in some situations they could be hidden by landscaping.

Preserving Natural Diversity

Dead and dying trees are removed near houses because they are hazardous and are considered unsightly. Many people not only remove dying trees near the house, but also from woodlots to prevent the spread of insect pests and diseases to other trees. However, recent reports from the National Forest Service emphasize the importance of retaining large dead and dying trees to maintain populations of cavity-nesting birds[1] Most of these birds feed on bark and leaf insects, and they may play a major role in controlling populations of insects that attack trees[6]

Snags appear untidy if the primary esthetic criteria are neatness and symmetry. In the context of a more subtle esthetic judgment valuing natural diversity, a well-managed woodlot without dead trees is sterile and uninteresting. A dying or recently dead tree may be home to woodpecker nests and abandoned woodpecker holes inhabited by flying squirrels and nesting wrens and titmice. Later, as the dead wood rots, chickadees may dig a nest cavity and the base of the trunk may be decorated with bracket fungi. Even after the tree falls it will be rich with living things: delicate, ornate salamanders live under the fallen tree, while the moss-covered top is a rich seed bed for tree seedlings and herbs. The nutrients of the tree are returned to the humus or directly to other growing things. Rigorous removal of dead wood from a woodlot or large garden breaks this intricate cycle and reduces the diversity of living things. Naturalistic landscaping can result in a more complex and interesting environment than more formal landscape designs, and may even provide a place for weathered snags and the diverse group of birds and other animals that depend on dead wood.

Footnotes

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A pair of house-hunting Eastern bluebirds finds a downy woodpecker excavating a cavity in a dead birch tree. In the distance tree swallows gather insects while on the wing. Other cavity nesters include the tree swallows, tufted titmice, white-breasted nuthatches, house wrens, and great crested flycatchers. Drawing by Julie Zickefoose

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Chemical Ecology of the Garden

Kurt E. Redborg

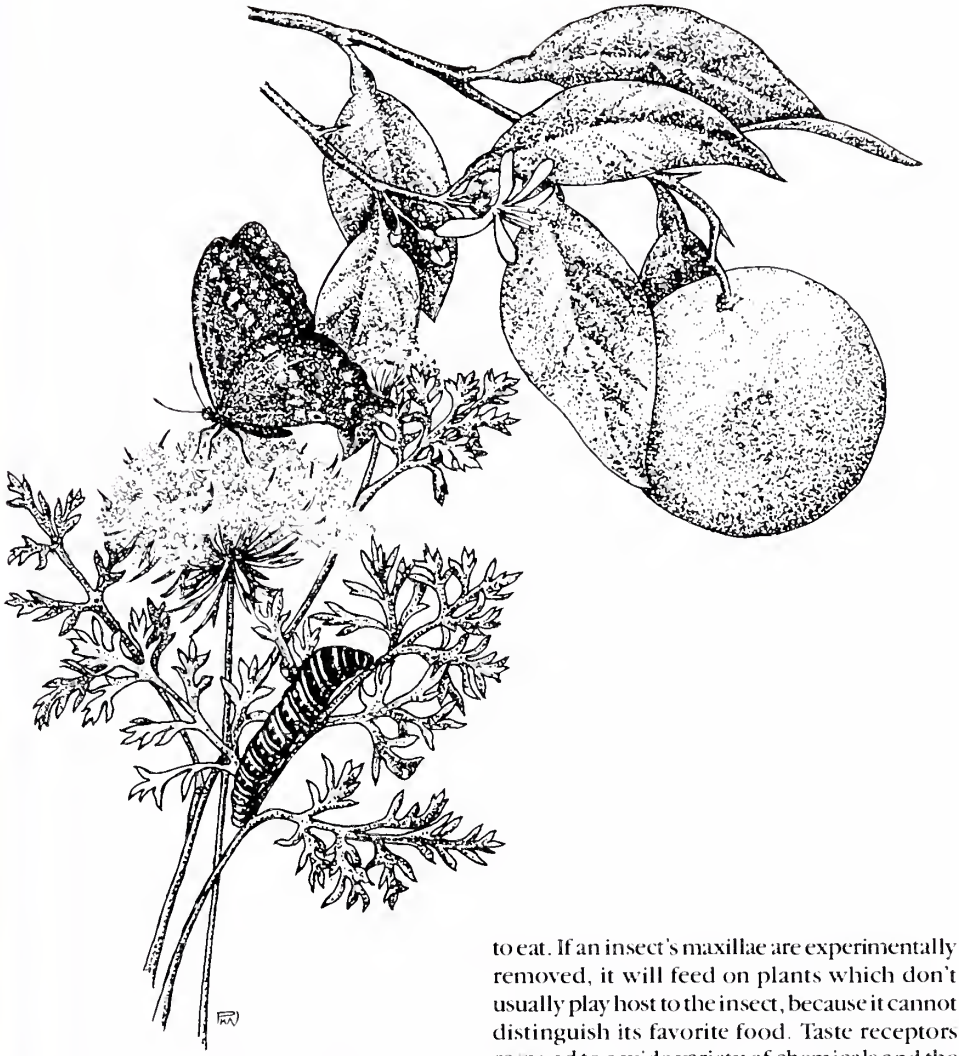
Think of the most bizarre, unusual way of earning a living that you possibly can; chances are there is some insect that is already doing just that. Nearly one million of these creatures have been described and new species are being discovered every day. One entomologist has speculated that the total number of insect species existing on this planet may be as high as 30 million! Insects can make a go of it in a rotting log, in a ball of dung, or in the minute area between the upper and lower epidermis of a plant leaf. The structural limitations imposed by their hardened armorlike exoskeletons demand that they be tiny—a blessing in disguise since insects can occupy environments unheard of for lumbering giants like ourselves. Changes in size necessitate periodic shedding of skin and secretion of a new and larger one. This miraculous ability to change their form is called metamorphosis. The next time you see some ugly-duckling of a caterpillar spin a cocoon, think of what it would be like to spend half your life as a human being, and half as some completely different creature.

One of the simplest ways for an insect to support its existence is by the tried and true method of eating plants. When insects invade our gardens or tree and shrub-filled yards, our interest in them may turn to irritation. However, the manner in which some insects locate their food provides an excellent example of the role of co-evolution between them and the plants on which they feed. Insects and higher plants have evolved together, and over eons of time, the insects have developed clever ways of finding the tastiest, most suitable plant, for their ecological niche. Grasshoppers and gypsy moths locate their food by chance, and are not particular what it is. Squash beetles *(Diabrotica),* however, feed on any of the cucurbits, including pumpkins and melons. The plants of this family produce a bitter chemical compound which attracts the insects, and which does not seem to be of any other value to the plant. Changes in the genetic material in certain plants over time have caused the production of special compounds which are either attractive or repellent to the insect. These are called "allelochemics." Where the allelochemics repelled insects and thus protected the plants, the plants were able to expand their range and give rise to new species.

But the insects' genetic material and thus their chemistry can *also* change, and the insect can develop the ability to either neutralize or detoxify a plant poison. In this case, the insect will specialize in eating a particular group of plants, as the squash bugs do when they visit your melons. Chemical co-evolution between plants and insects is like a game of tag. The insect which became able to digest a poisonous plant toxin may be out of lunch if the plant chemistry changes yet again, and the new compound is toxic to the insect.

A chemical that was once a feeding deterrent may become an attractant, and a trigger for the insect to begin feeding. Insect mouth parts (maxillae) have hairlike receptors for tasting with incredible sensitivity. Some caterpillars can be induced to eat filter paper or other inedible material if it has been soaked with an extract of a plant which has a feeding stimulus; the hair receptors on the maxillae tell the insect to begin

Dr. Kurt E. Redborg is Assistant Professor of Zoology at Connecticut College. He is an entomologist trained at The University of Illinois who has served as director of educational services at the Thames Science Center in New London, Connecticut.



Plants of two different families, citrus at the top and parsley at the bottom, produce the same three essential oils that are attractive to the larvae of black swallowtail butterflies.

All drawings by Peter Nelson.

to eat. If an insect's maxillae are experimentally removed, it will feed on plants which don't usually play host to the insect, because it cannot distinguish its favorite food. Taste receptors respond to a wide variety of chemicals and the insect integrates a great deal of sensory information in selecting its "choice" of food.

Examples abound, including many that can be found in our own backyards. The tomato hornworm, the larval stage of a large Sphingid moth, feeds only on plants of the Solanaceae including tomato, eggplant, and pepper. Members of the family contain many alkaloid compounds, such as tomatine in tomato, which

Cabbage worms feed on cabbage and will also feed on nasturtiums which although not in the mustard family do contain similar mustard oil compounds.

probably serve as feeding stimulants for the larvae. Plants such as cabbages, Brussels sprouts, and radishes belong to the mustard family (Cruciferae) and contain allelochemics known as mustard oil glycosides which have been shown to be egg-laying and feeding stimulants for the cabbage white butterfly, *Pieris rapae.* Most interesting is the fact that this butterfly will also feed on the garden nasturtium which is not a Crucifer but does contain similar mustard oil compounds.

Some insects are definitely worth attracting to your garden by growing the appropriate plant. The black swallowtail, beautiful as both a caterpillar and adult butterfly, can be attracted to the garden with parsnip, parsley, dill, fennel, and celery plants. These plants contain three essential oils that are feeding stimulants for the larvae. They will also feed on members of the citrus family which contains the same three oils. These chemical similarities between the parsnip and citrus families suggests a closer evolutionary relationship between these families than had been previously supposed. One might say that the black swallowtail is a good taxonomic botanist. When disturbed, the swallowtail larva protrudes two bright orange scent horns which exude an oily yellow secretion with an aniselike

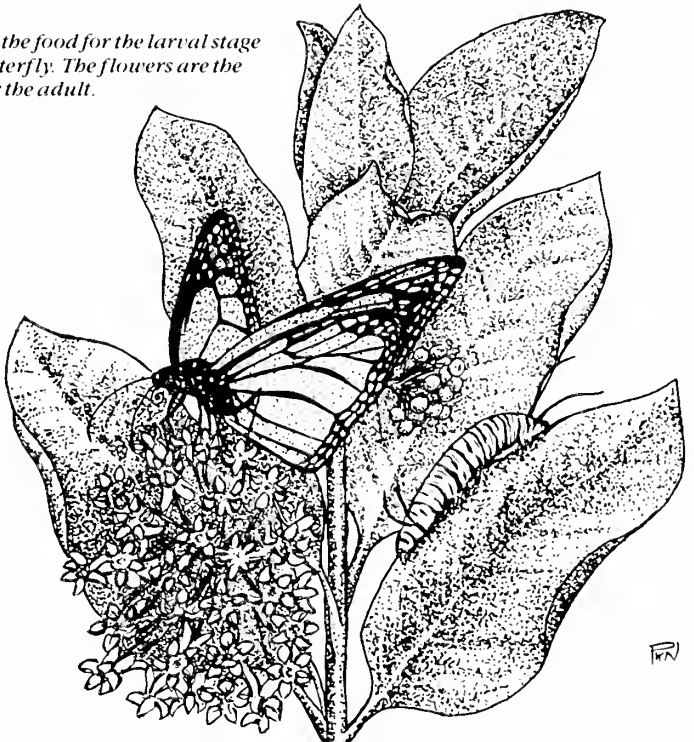
like odor. As if to lend support to the adage "waste not, want not," the caterpillar has converted some of the plants' chemical substances into a defensive mechanism of its own.

The monarch butterfly is another insect that subverts plant chemicals to its own use. Cardiac glycosides, powerful poisons that affect vertebrate heart rate, are isolated by the larvae from the milkweed that they eat. Not only do these glycosides protect the plant from insect attack, they protect the larvae and adults of the monarch from attack by birds, because the insects poison the predator. The insects are brightly colored to advertise their distastefulness. One unpleasant encounter is usually enough to convince birds to "leave those orange and black butterflies alone." If you have milkweeds growing near the perimeter of your garden, consider leaving them as a source of attraction for these beautiful creatures.

Chemical ecology does not end with insects that eat plants. There are chemical cues for insects that eat insects that eat plants. Both the imported cabbage worm and the tomato hornworm are searched out by different species of small wasps belonging to the order Hymenoptera which lay their eggs within the body cavity. After hatching, the wasp larvae eat the caterpillar from the inside out. The caterpillar does not die until the very end, its vital organs having been consumed last. This bizarre form of predation, which sounds like it was made up for the plot of a science fiction movie, is termed *parasitoidism*. In the case of the hornworm, the parasitoid larvae burrow back out of the caterpillar and spin cocoons on its back, perhaps the final indignation. Like herbivores, parasitoids can be very host specific and locate their food by chemical signal. These signals could be plant substances emitted from injured plant tissue but they might be substances emitted from the plant eater itself, such as its chemical mating attractant or products associated with it such as frass or silk. One parasitoid may serve as a host for a secondary parasitoid which in turn may be attacked by yet another. The cecropia moth caterpillar, for instance, is at the beginning of a chain that includes no less than six different parasitoids.

As human beings we often tend to be somewhat chauvinistic and assume that other organisms perceive the world in the same way that we do. But the sensory energy that we respond to is only a small portion of the energy signals that are actually available to living organisms. The next time an insect flits through your garden, think of the chemical information bombarding its senses to which we are completely oblivious.

Milkweed provides the food for the larval stage of the monarch butterfly. The flowers are the source of nectar for the adult.



Plant a Garden for Beauty and the Butterflies

Maryanne Newsom-Brighton

Any gardener worth his or her tomatoes knows the horror of discovering an army of chomping caterpillars encamped in the cabbage patch. Yet one might argue in favor of caterpillars. After all, they mature into the wildly colored, delicate creations known as butterflies. And what gardener would not welcome the lovely butterflies!

America, long an advocate of wildlife plantings to attract birds and small animals, is now discovering plant management to encourage the fluttering gems of the insect world. Planting a butterfly garden is not a matter of sowing seeds which produce butterflies, but seeds whose plants will attract butterflies. Color, copious nectar and an "easy feed" are the three crucial requirements. Purple will catch a butterfly's attention first; yellow, pink and white are other favorites. Remember, too, butterflies need flowers with flat surfaces, clustered florets or large-lipped petals where they can perch comfortably while dining.

Monarch butterfly feeds on Joe-Pye Weed. Color plays a large part in attracting butterflies—in order of preference: purple, yellow, pink and white.

Swallowtail butterfly visits the brilliant orange flower clusters of butterfly weed (Asclepias tuberosa)—*a plant of the summer fields.*

Among the parade of flowering plants which attract butterflies two rank as the grand marshals. Butterfly weed *(Asclepias tuberosa)* is an orange milkweed of prairie regions. It prefers sandy, well-drained soil, but will readily naturalize in clay-based soils, providing tangerine-hued lunch counters for passing butterflies. *Buddleia*, or butterfly bush, a woody shrub, bears long spikes of pastel florets that resemble lilacs. Considered an evergreen in mild climates, the shrub dies back to the ground in winter elsewhere and comes back in early summer with new branches; flowers appear from late July until frost. Fritillaries, Swallowtails, Red Admirals and Painted Ladies will swarm to it.

Butterflies appear from early spring through late autumn, and a butterfly garden should be planned to bloom accordingly. The earliest spring butterflies — Mourning Cloak, Tortoiseshell and Comma — are hibernators who have spent the winter in a dormant state. They eagerly cluster around early pussy willows *(Salix caprea)*, shrubs of damp areas which flower long before anything else has even thought about it. Of the cultivated spring-flowering butterfly choices, rock cress *(Arabis)*, lavender *(Lavandula)*, primrose *(Primula)*, purple rock cress *(Aubrieta)*, and Sweet William *(Dianthus barbatus)* are all sun-loving perennials. For mass plantings, short (six to ten inches) *Arabis, Aubrieta* and *Primula* make good borders as does the annual variegated candytuft *(Iberis)*, while taller lavender (two feet) fills in as a solid background plant. Primrose likes moist, acid soil, but Sweet William will tolerate a poor sandy growing medium. If space and time are limited, a lilac shrub *(Syringa)* is a carefree choice whose fragrant purple blooms will woo Swallowtail butterflies and human appreciation as well.

Warmer weather brings the Red Admiral, Painted Lady, Fritillary, Sulphur and Monarch butterflies. All can be tempted with such annuals as *Gaillardia* (blanket flower), heliotrope, mignonette, *Scabiosa* (pincushion

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Maryanne Newsom-Brighton is a freelance writer who lives in Indiana. Her seven-acre homestead is registered with the National Wildlife Federation as a backyard wildlife habitat, a project which has involved planting and landscaping to provide food, shelter, water and nesting sites for birds, bees, butterflies and animals.

flower), and *Verbena*. Although heliotropes require well-drained rich soil to produce their lavender-hued, vanilla-scented flowers, both *Verbena* and *Gaillardia* thrive in sandy or poor soil, providing a flashy collage of multicolored blooms even during dry spells. For the "plant-it-once" gardener, perennials like butterfly weed (not the same as butterfly flower, *Schizanthus*), daisies and wild milkweed are easy-care butterfly bait. Of all the varieties of daisies, those with yellow centers or petals will lure the greatest numbers of nectar-sippers.

To meet the needs of the migrators and hibernators, nectar must be available until frost. Late summer/early fall butterfly choices are *Buddleia* (butterfly bush), *Phlox,* and *Sedum spectabile* (summer glory). Although there are numerous species of sedums, only the *Sedum spectabile* with its fleshy leaves and flat-topped dusty pink flowers is prized by butterflies.

If enough butterflies soar, float, flutter and cavort through one's garden, the inevitable result will be caterpillars, for the butterfly life cycle is a complete metamorphosis in four stages: egg, larva or caterpillar, pupa or chrysalis and adult. Most caterpillars are fussy eaters, finicky to the point of self-starvation if the proper food plant is not available. Luckily for the gardener, the majority of butterfly larvae prefer weeds over vegetables — milkweed for the Monarchs, clover for the Sulphurs, nettles for the Tortoiseshell and Red Admirals, thistle for the Painted Ladies, poplar and willow for the Mourning Cloaks.

Only the Fritillaries and Swallowtails sometimes munch themselves into trouble. Fritillary caterpillars relish passion vine and violets and can reduce the plants to shredded tatters. Swallowtail larvae feast on members of the Umbelliferae and, if the population gets out of hand, can decimate carrots, parsley, fennel and anise. However, the black-and-yellow striped chompers can be hand-picked and relocated on wild Queen Anne's lace where they will be just as happily nourished.

Butterflies suffer from habitat loss just like any other form of wildlife; their numbers hinge on the amount of food and territory available for both adults and larvae. A weedy patch in an out-of-the-way corner or an untended fence row can provide an excellent butterfly nursery with no maintenance, while a well-planned flower garden will benefit the adult insects. Additional "feeding stations" might take the form of bare patches of dry dirt baited with a bit of rotting fruit or dead fish.

Whether a butterfly garden is a single *Buddleia* shrub or massed beds of blooms, the neighborhood butterflies will soon locate them. The rewards are two-fold — not only showy blossoms swaying on green stems, but also fluttering bouquets of the flowers of the air.

Wing markings identify butterflies

Of the nearly 700 species of butterflies which flutter across the United States, a handful stand out as abundantly common and, luckily for most of us, readily discernable. Some, like the Mourning Cloak, are one-of-a-kind. Others have numerous variations—there are over 30 species of Fritillaries, for example—but their overall appearance is similar enough that the family is easily identified.

When you identify a butterfly, note the markings on both the upper and lower surfaces of the wings. A good field guide, such as the "Audubon Society Field Guide to North American Butterflies", is a valuable aid. Most of the butterflies described below occur in one form or another throughout North America.

Mourning Cloak looks like no other North American butterfly. The brownish maroon wings are bordered by a cream-colored band on the outer edge. Brilliant blue spots parallel the inner edge of the band. With a wingspan of two-and-seven-eights to three-and-three-eights inches, the Mourning Cloak is common throughout the U.S.

Tortoiseshell is distinguished by broad, ragged-edged wings which spread two-and-one-half to two-and-seven-eights inches. The wings are a rich, rust-brown near the body, blending to yellow-gold crescents at the outer margins. Somewhat particular in habitat, it dwells in the dense woodlands and along river courses in Canada south to Oregon, Colorado, Minnesota and the mountains of Missouri and South Carolina.

Comma can be found from eastern Colorado to the Atlantic coast, south to Georgia. The Comma is a rust-brown color with black blotches; the hind wings are marked with a broad dark margin. The most distinctive mark is the silver backward C on the underneath side of the hind wing.

Swallowtail is a large, brightly colored but-

Photo by George Takamis

Newly emerged black swallowtail butterfly rests above parsley plants—a favorite food of the caterpillar.

terfly with "tails" on the hind wings. Some variety of Swallowtail is found in every part of the U.S. The three most familiar Swallowtails are the Tiger (yellow with black striping across the wings), the Zebra (white with black stripes and a swordlike tail), and the Black (black and blue-black with yellow, orange and/or cream spots on wing rim.)

Sulphur loves open country, meadows and parks anywhere in the U.S. except Florida. It is a smaller butterfly (wingspan 1¼ to 2 inches) in some shade of yellow or yellowish-green. The Sulphurs keep their wings closed when feeding or resting.

Fritillary is generally dull orange with black blotches on the upper side. The underside of the wings looks like a checkerboard of silver, white or yellow spots edged in black. Fritillaries appear to have only four legs instead of six because the forelegs are vestigial and nearly useless. Some variety of Fritillary inhabits every part of North America.

Red Admiral is most easily recognized by the orange-red bars which cross the front wings and border the hind wings; it looks like a huge orange "U" was stamped on the black butterfly. Red Admirals are common from subarctic Canada to Central America.

Painted Lady is also known as Cosmopolite and considered by some to be the most widespread butterfly in the world. The upper side of the wings is gold near the body, blending to salmon-orange, then black on the wingtips. The underside of the wings is patterned in white, blue, olive and brown with an orange streak under the front wings.

Monarch migrated across all of North America except through Alaska and the Pacific Northwest coast. It is characterized by its brilliant orange wings with their black veins and black margins sprinkled with white dots.

A Garden Fit for Hummingbirds

Maryanne Newsom-Brighton

"DON'T MOVE," my husband whispered, across the irises. As I waited, motionless, I heard a buzzing, punctuated by high-pitched squeaks, right behind me. Turning slowly I found myself nose-to-bill with a ruby-throated hummingbird that was investigating my red shirt. We stared at each other a few seconds, the bird and I. Then, apparently satisfied that my blouse was *not* some strange new flower, the "hummer" sped off to sample the nearby columbines.

Such encounters are common in our garden. The hummingbirds whizzing by sometimes unnerve visitors, but apprehension quickly gives way to fascination. Delicate, fearless, and quick as lightning, hummingbirds have charmed and amazed people for centuries. Ask anyone who has ever hung out a red-tinted sugar-water feeder in hopes of enticing the bird that Audubon admiringly called "a glittering fragment of the rainbow."

Syrup may appeal to the hummer's sweet tooth, but it does not provide all the nourishment required by the quarter-ounce bird. The serious hummingbird watcher needs to plant a garden. Hummingbirds feed every 10 to 15 minutes from dawn to sunset, often consuming more than half their weight in food and eight times their weight in water per day. One male Anna's hummingbird requires the nectar from 1,000 fuchsia blossoms to maintain his metabolism for a single day. Hummingbird gardeners, remember: Plant plenty.

The ideal hummingbird plant is red, orange, or pink and has either large, solitary flowers or loosely clustered blossoms that often droop. The typically tubular flowers hold copious reservoirs of nectar at the base of a long, stout floral tube and frequently have protruding stamens or pistils. Scent is unimportant, for hummers depend on sight rather than smell. Red flowers usually contrast sharply with the surrounding vegetation, although in the Southwest, where much of the landscape is brown, greenish flowers are a beacon to hummingbirds. Fledglings learn by trial and error to seek out tubed nectar flowers, most of which are red. The youngsters soon link red with food. So strong is the association that throughout their lives hummingsbirds boldly investigate every new source of red—roses, bandanas, neckties, even the insulators on electric fences.

The birds are belligerent and territorial, and some will tirelessly defend every food source in sight. For this reason, hummingbird plantings for more than one bird should be separated. The prized perch in our yard is a utility wire between house and garage. From there the dominant hummingbird—we call him the Baron—commands a view of a salvia bed, four-o'clocks, a buddleia, jewelweed, red-hot pokers (*Kniphofia* species), and even our sugar-water feeder. He sends intruders packing amid a flurry of flashing wings and avian expletives. Thus far the Baron has evicted butterflies, northern orioles, and a chipmunk—not to mention countless other hummers. We have outsmarted him by

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adding a border of scarlet sage to the backyard, where other hummers can feed out of the Baron's view. (Blooms that lack a landing platform will discourage competition from bees and butterflies.)

When choosing plants, consider species whose bloom dates overlap, thus supplying a continuous source of nectar. Among the flowers most popular with both hummingbirds and gardeners are the scarlet sage (*Salvia splendens*), nasturtium (*Tropaeolum majus*), and four-o'clock (*Mirabilis jalapa*). Salvias bloom from early summer until frost, generally thriving in full sun, although partial shade may be necessary in the South. They lend themselves to bedding and range from eight-to ten-inch dwarfs to three-foot-high cultivars. Nasturtiums thrive on neglect in dry, infertile soil and full sun but tend to be at their best in cool weather. If space is limited, try a hybrid nasturtium bred for climbing a trellis or hanging from a basket, like 'Fordhook's Favorite'.® Steer clear of double-flowered varieties; their nectar cache is not as obvious or as accessible to hummers.

Toss the four-o'clock seeds in the garden and forget them. They sprout readily, bloom profusely, and true to their name, open their red, yellow and white blossoms in late afternoon, earlier on cloudy days. Four-o'clocks tolerate dust, soot, fumes, and other airborne particles of pollutants. Allow four-o'clocks plenty of room, and be prepared to enjoy them for years to come, as they reseed themselves with enthusiasm. Three years ago I converted one bed of salvia to four-o'clocks, just for that summer—or so I thought. But each spring volunteer four-o'clocks crowd out whatever else I plant there. I'm not thrilled, but Baron thinks the results are grand and jealously guards that

Flowering crabapples (below, a tea crab) Malus *spp. offer spring color and clustered blossoms, attracting hummingbirds.*
Photo by Gottscho-Schleisner, Inc.

Photo by Goldsby-Schlesner, Inc.

Butterfly bush (Buddleia davidii) *has either purple, pink, blue or white flowers. Insects and spiders provide much of hummingbirds' diets and are often snatched from this plant.*

particular bed from his perch on the electric line.

Hummingbirds inhabitat nearly all of the United States, although they are rare in the Great Plains, and only in the Sun Belt—Florida through Texas and the Southwest— do they reside year-round. Elsewhere they merely summer, and flee south with the approach of cold weather. Spring migrants usually return with the blossoming of their favorite nectar plants. A cool, damp spring may delay the flowers but not the birds. Our southern-Indiana hummers arrive the first week of May regardless of the weather, and some years early-blooming quince and sugar-water feeders are crucial to their survival until the flower season is in full swing. Tardy autumn stragglers are just as vulnerable, depending on late bloomers like red sage and jewelweed, plus a still-full sugar-water feeder, for a successful migration.

Although the ruby-throated is the only species of hummingbird east of the Mississippi, the region west of the Great Plains and on to the Pacific Coast hosts at least seven common species and a few other casual visitors who stray north from Mexico. I have seen a broad-tailed hummingbird high in Colorado's Rocky Mountains and a rufous hummingbird along the Alaskan coast. Calliope, Anna's, black-chinned, Costa's, and Allen's hummingbirds round out the western roster.

The hummingbird's favorite flowers of the West, painted cups or Indian paintbrushes (*Castilleja* species), are wildlings not suited to transplanting. However, the century plant (*Agave americana*) will make any western garden a four-star restaurant for a hummingbird, as will scarlet gilia (*Gilia* species), trumpet honeysuckle (*Lonicera sempervirens*), and tree tobacco (*Nicotiana glauca*). Red-flowering gooseberry (*Ribes speciosum*) and red-flowering currant (*Ribes sanguineum*) draw a crowd in West Coast gardens.

In recent years Taylor Herb Gardens of Vista, California, has introduced ruby, golden, and amethyst "hummingbird flowers." The ruby flower, pineapple-scented sage (*Salvia elegans*), and the amethyst, Mexican-bush sage (*Salvia leucantha*), are shrubby natives of Mexico, where they grow four to six feet high. The golden hummingbird flower, better known as lion's ear (*Leonotis leonurus*), is from South Africa and was once used medicinally. All three love sun, tolerate poor soil, and bloom all summer. "We maintain a six-foot-thick hedge of them," says Kent Taylor, "and the hummingbirds swarm over them to the exclusion of everything else." Taylor points out that his hummingbird flowers are perennial in the South and Southwest, but in colder climates they must be cut back, potted, and over-wintered indoors or treated as annuals.

Gardeners in the Southeast may want to plant a mimosa tree (*Albizia julibrissin*) to please the ruby-throated hummingbirds. Other tropical plants for hummers include scarlet bush (*Hamelia erecta*), royal poinciana (*Delonix regia*), a scarlet mallow (*Hibiscus coccineus*), purple cestrum (*Cestrum purpureum*), and the yellow-flowering lantana (*Lantana camara*).

Many hummingbird watchers supplement their flower offerings with sugar-water feeders. A solution of one part sugar to four parts water is recommended. Anything stronger is considered too sweet—although the birds themselves might disagree. Bring the solution to a boil, turn off the heat, and allow it to cool. Coloring is not necessary; with all the controversy over red dyes for human consumption, why take a chance on hummingbirds? Sugar solutions must be kept fresh. Honey is definitely a "no-no," as it is easily contaminated and subject to souring.

fermentation, and bacterial growth.

Sugar-water feeders are available at most garden centers, feed stores that carry wild-bird seed, and specialty mail-order companies. Buy a feeder that is easy to clean and holds several ounces. One of my early purchases was a two-ounce vial; I found myself running out to refill it twice a day. My present feeder holds a cup, but at the season's peak I'm lucky if it lasts two days.

Sheer speed (hummingbirds have been unofficially clocked at around 30 mph) keeps a hummingbird safe from capture, but other perils are not so easily avoided. Feeders and plantings too near a window invite crashes, especially when quarreling birds become rambunctious. Pesticides are a great danger. A surprising portion of the tiny birds' diet consists of insects and spiders. Hummingbirds snatch some in midair; they procure others from plum, cherry, apricot, and orange blossoms, as well as thistle, *Buddleia*, and the other nectar-rich blooms. Indiscriminate use of insecticides destroys insects vital to hummingbirds and coats the flowers themselves, endangering the lives of the beautiful creatures that feed on them.

Occasionally gardeners unknowingly prune off nest-bearing branches. Hummingbirds make thimble-sized nests, about an inch across, and camouflage them with spider webs, bud scales, and lichens. They frequently nest on small, down-sloping limbs near or over water. You might locate the nest by watching where the female goes when she leaves the feeder. The safest practice, though, is to hang up the pruning shears until the fledglings appear at the flower beds.

The tubular flowers of honeysuckle (below, Lonicera japonica*) hold quantities of nectar, hungrily sought by many species of hummingbirds.*

Photo by Gottscho-Schleisner, Inc.

Seeing Red: Plants for a Hummingbird Garden

The plants listed below are among hummingbirds' favorites. While reds dominate the list, there are plenty of other colors suggested to allow a varied planting. The most important aspect of designing a hummingbird garden is to plan for continuous bloom from spring to fall, ensuring an endless supply of nectar.

Common Name	*Latin Name*	*Annual Biennial Perennial*	*Bloom Dates*	*Color*	*Soil Requirements*	*Sun*	*Useful Range*
Flowers:							
Bee balm	*Monarda didyma*	P	July-August	red, pink	not particular	◐	zones 4-9
Bleeding heart	*Dicentra spectabilis*	P	May-June	rose	rich, well-drained	◐	3-9
Butterfly weed	*Asclepias tuberosa*	P	July-August	orange	tolerates most soils; thrives in dry, sandy sites	○	3-9
Cardinal flower	*Lobelia cardinalis*	P	July-frost	red	moist	○ ◑	5-9
Carpet bugle	*Ajuga reptans*	P	May-June	blue, purple	—	● ◑	4-9
Columbines	*Aquilegia spp.*	P	May-June	red, pink, yellow, blue, white	rich, well drained	○ ◑	3-9, depending on species
Coralbells	*Heuchera sanguinea*	P	June-September	red	moist, well-drained	○ ◑	3-9
Dahlia	*Dahlia merckii*	A or P (tender bulb)	July-frost	red, pink, orange, yellow, white	rich, well-drained	○ ◑	2-10
Delphinium or scarlet larkspur	*Delphinium cardinale*	P	June-frost	red	rich, well-drained	○ ◑	6-9
Four-o'clock	*Mirabilis jalapa*	A or P depending on climate	July-frost	red, rose, pink, cream, white	tolerates dry soil	○	4-10
Foxglove	*Digitalis purpurea*	P or B	June-July	purple, red, rose, cream, white	fertile	○ ◑	4-9
Fuchsia	*Fuchsia* 'Riccartonii'	A or P	July-frost	red	—	◐	6-10
Gladioli	*Gladiolus spp.*	A or P (tender bulb)	July-September	many colors	fertile	○	—
Jewelweed	*Impatiens capensis*	A	June-frost	orange	moist	● ◑	5-9
	Impatiens pallida	A	June-frost	yellow	moist	● ◑	5-9
Nasturtiums	*Tropaeolum majus*	A	June-frost	scarlet, orange, yellow, white	tolerates dry, infertile soil	○	—
Penstemons or beard-tongues	*Penstemon spp.*	P	June-July	purple, scarlet, pink, yellow	acidic	○ ◑	5-9, depending on species
Petunias	*Petunia spp.*	A	early summer-frost	many colors	loamy	○ ◑	—
Phlox	*Phlox drummondii*	A	July-August	many colors	tolerates dry soil	○ ◑	—
	Phlox spp.	P	July-frost	many colors		○ ◑	2-8 depending on species
Red-hot poker or tritoma	*Kniphofia uvaria*	P	July-August	red, yellow	moist, sandy	○	6-10
Sage	*Salvia officinalis*	A or P	midsummer	lavender	—	○	5-10
Sage, scarlet	*Salvia splendens*	A or P, depending on climate	July-frost	red	—	○	4-10
Snapdragon	*Antirrhinum majus*	A	June	red, pink, white	rich, slightly alkaline	○ ◑	—

Common Name	*Latin Name*	*Annual Biennial Perennial*	*Bloom Dates*	*Color*	*Soil Requirements*	*Sun*	*Useful Range*
Flowers:							
Spider flower	*Cleome spinosa*	A	August-September	rose, pink, white	any dry soil	○	—
Sweet William	*Dianthus barbatus*	A or B	May-June	red, maroon, rose, pink, white	—	○	3-8
Tobacco, flowering	*Nicotiana alata*	A or P	June-August	many colors	moist, fertile	○ ◑	perennial in the South
Zinnias	*Zinnia spp*	A	July-frost	many colors	—	○	—
Vines:							
Honeysuckle, trumpet	*Loincera sempervirens*	P	June-frost	red	moist	○	3-9
	Loincera heckrottii	P	June-frost	red and yellow	moist	○	3-9
Morning glory	*Ipomoea coccinea*	A	July-frost	red	not too rich	○	3-10
	Ipomoea purpurea	A	July-frost	purple to blue	not too rich	○	3-10
Scarlet runner bean	*Phaseolus coccineus*	A or P	July-frost	red	—	○	not frost hardy
Trumpet creeper	*Campsis radicans*	P	July-September	orange, red	rich	○	5-9
Shrubs:							
Azaleas	*Rhododendron spp.*		late May-June	red, pink, white	rich, acidic, well-drained	◐	2-8 depending on species
Beauty bush	*Kolkwitzia amabilis*		May-June	pink	well-drained	○ ◑	4-9
Butterfly bush	*Buddleia davidii*		July-September	purple, pink, blue, white	well-drained	○	5-9
Coralberry	*Symphoricarpos orbiculatus*		June	pink,white	—	○ ◑	4-9
Flowering currant	*Ribes odoratum*		May-June	rose, yellow	—	◐	4
Hardy fuchsia	*Fuchsia magellanica*		June	violet and red	moist, well-drained	○ ◑	6-8, with protection
Tatarian honeysuckle	*Lonicera tatarica*		May-June	red, pink	tolerates poor soil	○	3-9
Flowering quince	*Chaenomeles japonica*		April-May	red	—	○	4-9
Rose of Sharon	*Hibiscus syriacus*		July-August	pink, white	moist, well-drained	○ ◑	5-9
Weigela	*Weigela florida*		May-June	red, maroon, pink	—	○ ◑	5-9
Trees:							
Buckeye or horse-chestnut	*Aesculus glabra*		May	yellow to white	moist	○ ◑	3-8
Buckeye, red	*Aesculus carnea*		May	red	moist	○ ◑	8-9
Horse-chestnut	*Aesculus hippocastanum*		May	yellow to white	moist	○	3-8
Black locust	*Robinia pseudoacacia*		May	white	well-drained	○	2-10
Chinaberry	*Melia azedarach*		April	purple to lilac	well-drained	○	7-10
Flowering crabs	*Malus spp.*		April-May, depending on species	red, rose, pink, white	—	○	4-8, depending on species

Common Name	*Latin Name*	*Bloom Dates*	*Color*	*Soil Requirements*	*Sun*	*Useful Range*
Hawthorns	*Crataegus spp.*	April-May, depending on species	red, rose, white	tolerates neutral or poor soil	○	4-8, depending on species
Mimosa, silk tree	*Albizia julibrissin*	July-August	pink	tolerates poor, dry soil	○	6-9
Siberian pea tree	*Caragana arborescens*	May-June	yellow	well-drained	◐	2-9
Tulip poplar	*Liriodendron tulipifera*	May-June	yellow with orange markings	moist, well-drained	◐	4-9

*Blooming times may vary from one region to the next. These dates are given to suggest duration and sequence of bloom

○ = sun
◐ = partial sun or shade
● = shade

Ed. note: The zones apply to the USDA climate zone map.

Trumpet vine provides summer color and food for many hummingbards.

The Rose Plant Ecosystem.

A rose plant produces leaf, flower, fruit and seed. Every part of it is eaten by primary consumers. They are eaten in turn by secondary consumers, who are eaten by tertiary consumers.

Tertiary Consumers ←

hawks
owls
cats

Secondary Consumers

praying mantis
spiders
moles
shrews
ants
aphid lions
birds
skunks
rabbits

Primary Consumers

Primary Producer

Pollinators
bees
flying insects

Leaf Feeders
garden snail
Japanese beetle
leaf-cutter bees
caterpillars
leaf rollers

Root Feeders
weevils
grubs
nematodes

Sucking Insects
white flies
leaf hoppers
aphids

Rosa 'Lotte Gunthart'

Birds → **Fruit**
cedar waxwings
mockingbirds
mice
seeds

ON THE WATERFRONT

Noble Proctor

If you are lucky enough to move into a house with a river frontage, or a lake or decent-sized pond at the foot of the garden, spend some time watching what happens before planning any changes. Find out which waterside plants are growing there and which birds are using them for food or shelter. Large areas of reeds or so-called "bulrushes" may extend right across your frontage, and it is perhaps tempting to clear them away to give a clear view across areas of open water—but it may be much better to create a couple of large gaps in the cover, retaining some of it at either end and in a clump or two in the middle. This broken edge effect is likely to prove more attractive to more bird species than either a clear shoreline or a continuous, unbroken line of vegetation. By producing little bays and inlets you will provide loafing spots for duck, feeding areas for snipe and open crossing points which might help you to spot more furtive birds like the Virginia rail. You might also attract a heron and, if you provide one or two strategically placed perches, regular visits from a kingfisher.

If you are fortunate enough to have a long frontage on to a lake, it could pay dividends to think in terms of creating a length of irregular shoreline, with miniature bays, promontories and shallows. This will probably involve you in many hours' manual labor, but the chance of attracting more waterfowl and perhaps migrant waders like solitary and spotted sandpipers will make it very worthwhile. A big post in the water will also be useful as a perching place for a number of birds.

In upland areas, some gardens back on to rocky or fast-moving streams, where spotted sandpipers, and in the west, dippers, may all occur as breeding birds. Generally, it is not possible to manage the foot of your garden to attract these species, although a contrived bit of grav-

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Ponds create an area that will attract a variety of wildlife. Here the turtles line up to enjoy the sun.
Photo by Joseph Sweeney — BBG

A green heron perches upon a label in BBG's lily pools. He is an expert fisherman and awaits an easy catch.
Photo by Slim Zamucalt — BBG

Female mallard and her young rest on the center of a small pool containing a variety of aquatic plants.
Photo, Brooklyn Botanic Garden

elly shore might help sandpipers and a garden pond should certainly attract green herons. If there is none in place already, it would be worth positioning a couple of large, round-topped stones in the water where you can see them. All these birds will find them and use them—dippers may pause to feed in the eddies around them.

One final point concerning water frontages: a relatively swift-moving lowland stream may provide you with the opportunity of growing your own cress if you have the room to divert the water across a shallow area. This leads not only to good eating, but produces excellent conditions for a number of birds, including pipits and even warblers.

In addition, shallow water areas may also serve to attract small numbers of hawks who relish shallow water in which they like to bathe.

Water for birds

Most people, of course do not have rivers, streams, lakes or ponds at the foot of their gardens, but for many bird gardeners the provision of water is often one of their first considerations. Birds need water to survive; you can provide it quite easily, either as a simple drinking or bathing supply, or in the form of a man-made pond.

Birdbaths are available in a variety of forms, either on pedestals or as precast or molded mini-pools for placing at ground level. All of these are perfectly acceptable to birds, but you can just as easily make your own, using an upturned trashcan lid or a small sheet of heavy gauge pond-liner. If you do make your own, remember to give the birds easy access from gently sloping sides, or via a brick or stone placed in the water. Remember that shallow water is all that is needed; keep it clean of leaves

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Noble Proctor is Professor of Ornithology at Southern Connecticut State University. He has written several books and leads bird tours around the world. He recently won the Connecticut Conservationist Award.

Pigeons take a bath in a large fountain. The sound of moving water attracts a variety of birds, especially during migration.

and debris and change the water regularly.

Water is important in winter and, even if you do not maintain a year-round supply for your birds, you should endeavor to provide it in hard weather. The problem is, of course, that water freezes easily—so what is to be done? *On no account* should you add any form of anti-freezing substance to the water: the chances are that it will do some harm to the birds. You can, of course, adopt the irksome course of going out and breaking the ice regularly, or adding warm water at intervals, but nowadays most people think instead of installing a simple heater to maintain the water temperature above freezing point. An aquarium heater, available at any good pet store, does the job perfectly well but it will, of course, require external, weatherproof wiring—a local electrician should be able to advise you on this aspect. If you are putting water out in a shallow container, for example a trashcan lid, it is very effective to raise the whole affair on bricks and place a simple nightlight in the space underneath it.

Making a pond

Making an artificial pond is an exciting prospect (at least it is once you've dug the hole). This is in any case a popular and common practice among gardeners, and many of the better gardening books give excellent advice on what to do. A formal garden pool—even a fairly sophisticated water garden—will provide good conditions for birds, but in many ways a purpose-built pool is better. The only constraints are how much you want to spend and how much space you have available.

Broadly speaking, the aim is to produce a pond with a slightly irregular outline, shallow at the edges (or at least at one end) and not more that 3¼ ft deep in any place. It should provide "walk-in" access to birds and easily accessible drinking and bathing places. Through a mixture of native and more exotic plants, it can be both visually attractive and a good source of food for birds. A pool can be designed in conjunction with another garden feature—an adjacent rock garden perhaps. This could also provide a simple waterfall system whereby water is pumped up and returned to the pond by gravity, producing oxygenation which is essential for a successful and productive pond. The alternative is to stock the pool with plenty of oxygenating plants, hornwort, for example.

A heavy clay soil provides a ready-made pond-liner which will cost you nothing other

than a lot of sweat and toil. But soils with good drainage require entirely artificial techniques for which there are three alternatives. It is possible nowadays to purchase quite large, molded glass fiber ponds which are excellent for the small garden. Their major disadvantage is that the size and shape is predetermined by the manufacturers. Preparing a concrete lining, and coating it with plastic paint, gives you much greater flexibility, but is laborious and, once completed, very difficult to alter in any significant way. A better alternative is to line your excavation with heavy-duty plastic sheeting, which is no more expensive than the other methods and is much more flexible in design terms.

At all stages of construction, extreme care must be taken not to damage or puncture the sheeting. It is important to provide a reasonably smooth base on which to lay the sheeting and then to lay it generously, to allow for its movement and settling when soil is placed upon it, and again when you add the weight of the water. Allow a wide overlap at the edges and do not trim off the surplus until the whole pond is completed and filled. Again, be very careful not to damage the sheeting if any large stones, plant containers etc. are to rest on it.

Rainwater would eventually fill your pool, but it is better and faster to do it from the tap, using a hose pipe. Add a few buckets of water from a local pond to help introduce the first micro-organisms to the new environment. Allow the water to settle for about two weeks (topping up the level if necessary) before any planting is undertaken. The layer of soil you have placed on the pond-liner will provide most of what you need for planting, but plants in containers can also be placed as required; use some of the soil from the excavation to build up a low surround to incorporate the overlap of the sheeting and to provide a good moisture-retaining base for waterside plants.

Stocking the pond

Many of the plants available commercially for garden ponds will be suitable, but, for a more natural look, a much better strategy is to introduce a majority of natural species—the sort of things that grow in real ponds in your area. However, the law places certain restraints on the uprooting of wild plants, even common ones. Be sure that you have the necessary permission before going to your local pond for supplies; take only a few plants of the kinds you need and cause as little damage as possible while doing so. Choose only places where these plants are abundant. In many ways, it is often better to scrounge what you want from neighbors or friends with established ponds. As already mentioned, hornwort is an excellent oxygenating plant. Some other useful species you can introduce include water mint, water forget-me-not, water plantain, marsh marigold, mare's tail, yellow or blue flag iris, bogbean, purple loosestrife, frogbit (floating), amphibious bistort (floating) and (at the deepest parts) water lilies. Cattail *(Typha)* will grow well around the wet edges, as will bog arum, primulas and various ferns. The cattails will form big, attractive stands and may need some control as your pond matures. Unless you have a lot of room or are prepared to carry out continuous management it is probably not a good idea to introduce the highly invasive and fast-spreading common reed *(Phragmites)*.

There is a good chance that the American toad (and perhaps newts) will colonize unaided—but here, too, you can ask a friend or neighbor for spawn or tadpoles from a well-established pond. A supply of the spawn of the American frog could be even more valuable. This has become a scarce animal in some areas, and founding a new, protected colony could be an important local conservation project. Remember that both frogs and toads require easy access into and out of the pond—gently sloping banks or strategically placed stones will help them. They also like flat stones placed in the water, both at and just under the surface. During hot weather watch for falling water levels and adjust the exits accordingly.

Bird gardeners will welcome visits by kingfishers and green herons, but the latter can be unpopular in gardens where ponds are stocked with goldfish and other ornamental species. Netting over the water is an effective way to stop predation, while erecting simple string or wire lines around the edge of the pool can also be an effective deterrent. Model heron or heron-like birds often make gardeners groan with distaste, but they, too, can prove quite effective deterrents in the short term. Fortunately, green heron predation tends to be rather seasonal, at least in garden ponds, usually involving mainly young birds in the late summer and fall."

A Wildlife Garden in Newfoundland

Jane Power

The nature reserve of the Memorial University Botanical Garden, Oxen Pond, Newfoundland, has been designed to encourage flora and fauna in a balanced ecosystem. As you enter the reserve, you encounter a sun-exposed rough meadow, constantly maintained to discourage the pioneer growth of trees and shrubs. Sheltered from Newfoundland's prevailing winds by encompassing multiflora rose, native red elderberry and coniferous woodlands, this habitat provides an ideal environment for small mammals, birds and insects.

Wildflowers such as lance-leaved goldenrod, black knapweed and pearly everlasting, along with some grass species, offer favorite host and nectar sources for butterflies and other pollinating insects. Throughout the fall and winter months, birdfeeders are replenished daily, if need be, and are frequently visited by blue jays, black-capped and boreal chickadees, slate-colored juncos, purple finches, evening grosbeaks and the occasional flicker. Bird boxes provide sanctuary for tree swallows and chickadees in the spring and summer. Bordering the coniferous woodlot are bat boxes, designed to attract Newfoundland's more common bat species, the insectivorous little brown bat.

Not much further along, a habitat simulating a woodland glade is managed primarily for butterflies. The herbaceous plants cow parsnip, scotch lovage and angelica have been introduced as hosts for the caterpillars of the short-tailed swallowtail; while the woody plants chuckley-pear, pin cherry, choke cherry and a self-seeded apple tree provide food for the caterpillars of the Canadian tiger swallowtail and white admiral butterflies.

Patches of lance-leaved goldenrod have been located where the sun hits them at different times of the day, thus ensuring that nectar is available for as many hours as possible. This native wildflower is one of the best known nectar sources for late summer butterflies; at least 11 species have been observed using it in Newfoundland. Twenty-six butterfly species have been recorded in the Memorial University Botanical Garden; some have not been seen anywhere else in Newfoundland.

A woodpile, one of the many throughout the Garden, is especially constructed to provide shelter for overwintering butterflies and refuge for snowshoe hare and other small mammals. Felt, in the surface layer of the woodpile, assists in keeping the interior dry.

Wildlife gardens inspire and educate. Here student, artist and gardener may enrich their knowledge of the natural world.

Cardinals are regular visitors to feeding stations. Their favorite food is sunflower seeds. At left, Northern Cardinal.

MUSKRATS

Cathy Walker

Muskrats have been one of the most destructive pests at the Chicago Botanic Garden.*

They are large water rodents with brown fur and webbed feet.

Muskrats will feed on just about anything. Our water garden was completely destroyed by them the year it was installed. Leaves of the water lilies and lotus were chewed but they primarily fed on the submerged tubers. Any plant in the water or near the water's edge is considered to be in danger of muskrat damage. They have chewed off young branches of shrubs, tender bark of trees (girdling them) and tree and shrub roots growing near the water. Once, they undermined and ate an entire bed of bulbs that was adjacent to the lagoon. *Iris pseudacoris, I. versicolor, Juncus spp.* and *Pontederia cordata* were the only plants not readily eaten but when all other food was gone the muskrats would feed on them too! They can be seen feeding at any time during the day.

The muskrats live in burrows along the shoreline. They burrow under trees and shrubs creating air pockets. When the roots of nearby vegetation grow into their tunnels they quickly dry out and are killed. Almost all of the trees and large bed areas at the garden are tiled and drain directly into the lagoon. These drainage tiles make a perfect pre-constructed home for the muskrats.

Our Plant Protection Department has been working in cooperation with the Illinois Department of Conservation to try to minimize our muskrat population. Underwater traps were set beneath the ice during the winter months. Live traps set along the shoreline can be used but catching the muskrats is more difficult as they do not like to come out of the water.

For additional protection in the water garden, the tubers of the water plants were covered with one inch square galvanized wire mesh screen. The mesh screen provides a physical barrier that the rodents cannot get under while the plants are able to grow through it.

The muskrat is an aquatic rodent with brown fur and a long scaly tail. It is about the size of a small cat and lives in holes or mounds of rushes, brush and mud at pond's edges.

**Ed. note. The Chicago Botanic Garden is made up of nine islands surrounded by 60 acres of water.*

Cathy Walker is a Horticulture Information Specialist at the Chicago Botanic Garden, Glencoe, Illinois.

Urban Gardens *Attract Wildlife*

Barbara Pesch

Homeowners and apartment dwellers with little area to landscape need not despair. It is amazing to observe what wildlife will be attracted to urban areas where there are plantings of window boxes, barrels and small pools.

In a relatively small space on a 17th-floor terrace, I have had the good fortune to attract a surprising variety of wildlife. My plantings are all in containers—from boxes to barrels. In an old wine barrel I grow a water lily and this small garden pool attracts many birds for its water. An upright yew *(Taxus* sp.*).* Japanese black pine *(Pinus thunbergiana)* and purple-leaved plum *(Prunus cerasifera* 'Atropurpurea') occupy other large barrels. Geraniums, petunias, blue lobelia, impatiens and assorted houseplants cascade from pots and planters.

This urban terrace garden has been visited by four species of butterflies at regular intervals. Bees are also constant visitors. Birds have of course included pigeons, as well as house finches, blue jays, a wandering warbler or two and several kestrals. Other visitors to the terrace include a praying mantis (a miracle of sorts) and several squirrels. I try to discourage the latter as they are bent on digging up all my plants. But they are determined—the trip to my terrace is a 17-story climb along a fire escape!

The look of a window box in an urban setting can be its own reward. However, when the possibility of a passing butterfly or two is added (and perhaps even a hummingbird), the visual delights multiply enormously. Personally, I feel that attracting wildlife in densely populated New York is an exciting challenge.

Suburban Wildlife

Sally Taylor

How do we coexist with suburban wildlife in our gardens? Last spring when I went out to exult over the progress of my three year evergreen ground cover planting of different North Tisbury hybrid azaleas, fate and rabbits had played a cruel joke on me. There was not a single flower or leaf bud left on the tips of the low-growing woody stems. Each one had been neatly removed, with the slanting cut from a rodent. My heart sank, because I had not known that we had rabbits or woodchucks living on our land. Last winter was difficult, with an unusual amount of snow cover, lasting nearly to the middle of March. As the snow melted, the projecting shoots of the azaleas were delectable targets for a rabbit repast, for it was indeed a rabbit we saw coming back to the free lunch several days later.

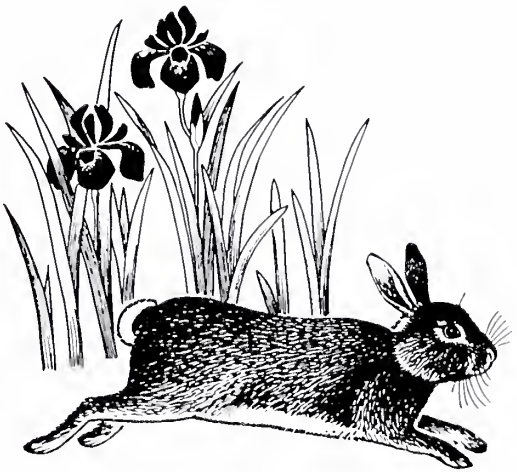
These North Tisbury hybrids are part of a planting of small or low-growing rhododendrons, extending along a raised bed. Small plants of *Rhododendron* 'Dora Amateis' and *R. racemosum* were untouched. We devised a low cage of chicken wire bent to cover the whole plant, and by fall new growth had appeared on all the cut stems. We lost a year's growth of buds and flowers, however, and this next season will see a low two-foot chicken wire fence around the azalea garden. The fine chicken wire is next to invisible, and is sufficient to deter the rabbits.

Another planting which the rabbits enjoyed was the ground cover three-leaved cinquefoil *(Potentilla fruticosa).* This also is a low-growing evergreen, and like other members of the rose family, attractive to rabbits. By midsummer, the cinquefoil had recovered, and in fact prospered from having a short haircut. By now, the clover in the lawn had become the lunch counter.

Woodchucks also arrived this year, and their specialty was the emerging day lilies, followed by new shoots of the tall *Aster novae-angliae.* The day lilies rapidly recovered and have gone on to a perfectly satisfactory summer, but the asters were set back so that few stalks have set flower buds this fall. Individual chicken-wire cages weren't a defense, because the woodchucks stood upright against the cages, bent them down and stripped the leaves from the wounded stems yet another time.

Lily bulbs were a casualty of smaller rodents. Or the woodchuck family might have wanted to vary its diet.

Deer have become a familiar sight on our property which is just one mile from downtown New London. One side of our property borders natural areas of the Connecticut Arboretum and it is here that deer have made their trails for trespass. As the unmanaged natural areas grow up to woodland from the fields they once were, the deer migrate to the less shady margins where there is a shrubby ecotone—in this case—my



garden. Their target was a new planting of several cultivars of Southern white cedar, especially *Chamaecyparis thyoides* 'Andelyensis.' This took cruel abuse, with all the branchlets stripped from one side of the plant, right to the center stem, and the growing tip itself crushed off in the typical fashion of the blunt-cut deer browse damage. The spreading English yew which had grown over fifteen years to a magnificent specimen ten feet across and four feet high had every growing tip stripped and crushed. Recovery has been slow, and the sight of stubby tufts of short needles along the branches puts one in mind of witches-broom plants.

Recent studies on controlling deer damage have not been encouraging, because when the animals are hungry, they will eat anything. Since there can be no retribution by hunting where houses are close together, or where dwellings are as close as 200 yards, fencing is the only recourse. When one lives at the edge of a natural area, it would be difficult to protect plantings with a fence higher than 6 feet (which they can jump). So, the yew will be but a memory next year. The cedar cultivar might be defended by an individual fence or cage around it, but what a way to garden!

The deer population of Connecticut is larger than in the days of early Colonial settlement because sentiment tends to create an extension of the "Bambi syndrome." With the cost of fish approaching $10.00 a pound, venison harvesting by skilled hunters would not be sacrilege. The demise of the English yew has hardened my heart.

Nests often hidden by foliage become apparent when the leaves fall.

Photo by F.B. Grunzweig
The National Audubon Society Collection
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Davison, Verne E. *Attracting Birds from the Prairies to the Atlantic.* Thomas Crowell Co., New York. 1967.

A guide to the favorite foods, nesting sites and water needs of 400 species of migratory birds, as well as a separate section on plants for food, arranged by common name. 252 pp.

De Graf, Richard M. and Witmer, Gretchen M. *Trees, Shrubs and Vines for Attracting Birds.* U. of Mass. Press, Amherst. 1979.

Native trees and shrubs are beautifully illustrated with black and white drawings. Text covers descriptions of flowers, fruits, leaves, habitat and landscape notes. A classic. 194 pp.

Dennis, John V. *The Wildlife Gardener.* Alfred Knopf, New York. 1985.

A complete discussion of wildlife and their garden habitats, including misunderstood reptiles and amphibians, mammals, insects beneficial and non-beneficial, earthworms, and birds. The black and white illustrations are fine, increasing the appeal of an unusually well presented book. 293 pp.

Kress, Stephen. *The Audubon Society Guide to Attracting Birds.* Alfred Knopf, New York. 1986.

Contains tables of recommended trees, shrubs and flowering plants for all of North America; plans for gardens, pools, ponds, feeding stations, diagrams for birdhouses, hints from birders around the country.

Pamphlets

Shrubs and Vines for Northeastern Wildlife. Northeastern Forest Experiment Station, Upper Darby, Pa. USDA Forest Service General Technical Report NE-9 1974.

A manual which describes 40 native shrubs, vines, and trees; their life history and use by wildlife; how to propagate and manage.

Planning for Wildlife in Cities and Suburbs. Fish and Wildlife Service, U.S. Department of the Interior. Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Stock Number 024-010-00471-1. 1978.

The booklet was prepared in conjunction with the American Society of Planning Officials and explores the importance of site design, habitat types, and the integration of wildlife considerations into site designs, vegetation management of open spaces along highways, airports as well as backyards of urban settlements.

Periodicals

The Living Bird. A quarterly publication of the Laboratory of Ornithology, Cornell University. 150 Sapsucker Woods Road, Ithaca, N.Y. 14850.

The Audubon Society's Video Guide to the Birds of North America: I.
A new series of video cassettes, now present four two-hour tapes covering all the North American breeding birds. The first tape features loons, grebes, pelicans, waterfowl, hawks. Behavior while diving, feeding, playing and flying is shown. Bird calls, verbal descriptions and animated range maps depicting migration routes are all part of this exciting package. Available from The Crow's Nest Bookshop, Laboratory of Ornithology, Cornell University, Sapsucker Woods Road, Ithaca, New York, 14850 for about $70.00

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IN GARDENING AND HORTICULTURE

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The Year's Highlights

In Gardening and Horticulture

1987/88

Brooklyn Botanic Garden

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BROOKLYN BOTANIC GARDEN RECORD

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Cover photograph by Everett Ortner
Cranford Rose Garden gate

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Poisonous Plants

Peter K. Nelson

Plants, since the advent of bottle tops that cannot be easily opened, have displaced aspirin as the most frequent cause of poisoning among children. And each year a number of cases of poisoning in adults can be traced to plants. "Poisoning" does not necessarily imply fatality—most poisoning cases result in pain, discomfort and illness of longer or shorter duration; comparatively few result in death. And nearly all could be prevented by a little care and common sense. Each spring one sees a burgeoning in local papers and in magazines of rather alarmist articles on poisoning by plants and the great danger thereof. These articles, while useful, are also unduly frightening. The best approach to poisonous plants which undeniably are all around us is "Be careful, not fearful."

By poisonous plant we mean any plant that by ingestion, or in some cases by contact, can cause more or less severe physiological reactions or upsets in people or in domesticated animals. These reactions range from very temporary burning and itching, as from contact with common nettles *(Urtica dioica),* to death, as from ingestion of small amounts of poison hemlock *(Conium maculatum).* These effects are caused, of course, by chemicals that are produced in plants as a result of various metabolic processes. So far as the plants are concerned these are often waste products, and not infrequently they are harmful to the plants themselves. Since plants, unlike animals, have no specific excretory systems to eliminate wastes, these materials simply accumulate. If self-toxic, they must be sequestered in parts of the plant body where they will do no harm. Quite often these substances incidentally act as deterrents to insects and grazing animals that soon learn to avoid eating such plants and thus the toxins serve to aid the plants' survival.

Determining the toxicity of a given plant is not always an easy matter. Individual members of a plant species may differ widely in the amounts of any toxin they contain, depending upon their age, the soil in which they grow, weather conditions during growth, etc. To further complicate matters, individual animals or humans may differ greatly in their reactions to a specific poison. A good example of this is that some people can handle poison ivy freely (though for reasons discussed later it is not wise to do so) while others react strongly to the slightest contact with it. We may note here that various kinds of animals differ from one another and from *people* in their reactions to plant toxins. For this reason it is dangerous to assume that because animals, say squirrels or birds, can eat a fruit with impunity, that it is necessarily safe for humans.

Toxicodendron radicans, *poison ivy, has beautiful fall foliage. Here a vigorous specimen climbs the brick facade of a bank building in Massachussetts.*

Peter K. Nelson recently retired after 25 years as Professor of Botany, Brooklyn College of the City University of New York. Popular lecturer and illustrator.

The ripe fruit of Datura stramonium, *Jimson weed, is quite attractive. These plants produce a powerful alkaloid which can be found in the seeds or nectar.*

There are many chemically different toxins found in plants but some of them can be grouped according to their chemistry. A few of the more important of these groups will be considered here.

The first of these chemicals is known as the *alkaloids.* These are more or less complex compounds of widely differing chemical structure but all of which have an alkaline nature, most of which have bitter taste, and which cause physiological reactions when ingested by animals. In some cases these reactions are such that the alkaloids have medicinal value. Others, unfortunately cause illness or even death. As always, toxicity is strongly dependent upon amounts ingested. Colchicine, obtained from the bulbs of the so-called autumn "crocus" *(Colchicum autumnale),* is a deadly poisonous alkaloid. But used in extremely minute amounts it is valuable as one of the few known substances that can relieve attacks of gout.

Another important group of potentially harmful substances found in plants are glycosides. These chemicals contain a sugar, often glucose, and another portion which when separated from the sugar portion may be poisonous. In *cyanogenetic glycosides* the non-sugar part is hydrocyanic acid which as everyone knows is a very toxic substance. A large number of glycosides have been isolated in which the non-sugar part has marked effect on heart action. Some of these cardiac glycosides, as they are called, have medicinal use, the best known being digitalis. Dosages must be carefully controlled; too large amounts can be dangerous.

There are a number of other types of glycosides responsible for toxicity in plants but we need not deal with them here.

Compounds of oxalic acid are found in many plants, even a number that are commonly used for food. But amounts in food plants are small enough as to rarely cause a problem. Oxalate poisoning is a complex process not fully understood. It is known that drops in blood calcium to dangerously low levels and severe damage to kidneys as a result of calcium oxalate crystals forming in the tubules of those organs, are among the effects. Spinach, chard, and beet tops all contain oxalates in non-toxic amounts, but in the green leaf *blades* (not the leaf *stalks*) of rhubarb, concentrations of these compounds are high enough to make these leaves dangerous, even lethal.

There are a number of other groups of toxic compounds found in plants but we shall here mention only one more. *Phytotoxins* are proteins found in comparatively few plants, but they are of interest because some of them are among the most deadly substances known.

The following plants represent a fair sampling of those commonly found in cultivation that have been known to cause trouble.

Dumb Cane *(Dieffenbachia picta)* with its attractive leaves is a popular houseplant well called "dumb" cane. Biting into the stems will result in intense burning and swelling of the tongue and linings of the mouth and throat. Painful and frightening in adults, it is only apt to be really dangerous in small children or pets where the swelling of the throat could cause strangulation. The cells of the plant contain minute needle-shaped crystals of calcium oxalate and it was once thought these caused the reaction. There are toxic proteins present, however, which more likely are responsible, though the needles, by penetrating mucous membrane cells, may have some toxic effect as well as opening the cells to the other toxins.

Dieffenbachia belongs to the Arum Family of plants, and many of its relatives have the same effects to a greater or lesser degree. Philodendrons (there are many species) have been known to have caused death in cats which ate or chewed on them. Elephant-ear and Taro can also be irritating but this disappears when taro is cooked. In this same family, our wild Jack-in-the-Pulpit *(Arisaema triphyllum)* has corms and fruits which burn the mouth intensely if eaten. Again, cooking the corms destroys this property, hence another common name, Indian turnip. Skunk-cabbage, another wild aroid, is similarly irritating.

The flowers of Datura stramonium *are white, trumpet-shaped and purple stemmed. This plant is often found growing in empty lots and barn yards.*

Several plants used as Christmas decorations are poisonous if eaten. The berries of European mistletoe *(Viscum album)* are known to be poisonous and those of American mistletoe *(Phoradendron flavescens)* are suspected of being so; berries of holly *(Ilex aquifolium* or *I. opaca)* can cause nausea and diarrhea if eaten in a fair amount. The attractive orange-red berries of Jerusalem cherry *(Solanum pseudocapsicum)* have been implicated in poisoning of children; unripe fruits are more dangerous than ripe ones. The poinsettia *(Euphorbia pulcherrima)* is a member of the Euphorbia or Spurge family and shares the common family characteristic of having milky irritant juice. This juice can cause illness if taken internally and irritation, sometimes severe, on contact with the skin of sensitive people. Care should be taken to keep small children safely away from all these plants.

A number of garden plants can cause illness if wrong parts are eaten. Rhubarb has already been mentioned. Also an occasional source of trouble are potatoes. These, as well as tomatoes and peppers are members of the Nightshade or Tobacco family (Solanaceae). The whole family, which also includes Jimson weed *(Datura stramonium)* and other Daturas, Belladonna *(Atropa belladonna)* and henbane *(Hyoscyamus niger),* are notorious for the alkaloids they produce. Many of them are used in medicine, many are dangerous and, of course, a number are valuable food plants.

Potatoes sometimes are exposed on the surface of the ground and turn quite green inside. Such green potatoes and potato sprouts, stems and leaves should not be eaten. They contain the alkaloid *solanine* which is quite toxic. It should be mentioned that just as some varieties of potatoes have red skins, there are some that have greenish skins. It is not this very thin skin color we are talking about. The green color caused by exposure to light goes much deeper into the tubers.

The above-mentioned Jimson weed is a native Datura that is often found in waste lots and barnyards. Like most members of the genus *Datura,* it contains very potent alkaloids. Children have been severely poisoned by eating seeds found in its spiny fruits, or sucking nectar from the trumpet-shaped blossoms. In some cultures certain daturas have been used as hallucinogens. Because of the toxicity of these plants this is a dangerous practice, as is their use in home remedies for asthma.

Belladonna or Deadly Nightshade is a European plant occasionally cultivated in the U.S., but is has not become naturalized. It is toxic because of its alkaloids, one of the most important of which is atropine, used to dilate the pupils of the eyes. The attractive shiny black berries have been known to cause death in children. The scientific name of this plant *Atropa belladonna* is interesting. Belladonna of course means "beautiful lady." In medieval times court ladies squeezed the juice of the plant into their eyes, dilating the pupils and making them more lustrous. The fact that the ladies themselves could not see too clearly under these circumstances was apparently not a matter of concern. It seems to have been more important to look well than to see well! Atropa comes from Atropos, the name of the third Fate of Greek mythology. She cut the thread of life after her two sisters had spun and measured it.

The most famous plant in this family is of course Tobacco *(Nicotiana tabacum)* whose use is so well known as to need no discussion here. The alkaloid in tobacco is the extremely toxic nicotine. Tobacco manufactures the alkaloid in its roots but transports it to the leaves for storage. There is on record an instance of an experimentally-minded gardener who successfully grafted tomato plants onto tobacco roots. (These plants are sufficiently closely related that such grafts sometimes succeed.) The tomatoes produced fruits which he generously shared with his neighbors. Unfortunately enough nicotine got from the tobacco roots into the tomato fruits that they all became quite ill from eating them.

There are also a number of wild members of the Nightshade family which are toxic to a greater or lesser degree. Among these are the bittersweet, *Solanum dulcamara* a common semi-woody vine with small violet flowers and handsome brilliant red, juicy berries which might prove very attractive to children despite their bitter taste. When a very small child finds something unpleasant in his mouth he can get rid of it by spitting it out or swallowing it. To the

Cicuta maculata, *water hemlock, grows in wet places. The flower clusters resemble Queen Anne's Lace. The roots resemble parsnips, but are quite poisonous.*

Celastrus scandens, *bittersweet, much prized for its orange and red berries used in fall and winter bouquets is not poisonous, but there are plants that have red berries that are poisonous.*

child which way it goes matters little; so bad taste will not always prevent eating a harmful substance. It should be pointed out here that this bittersweet is not the same as the woody *Celastrus* with its orange and red berries so much used in dry winter bouquets. There is some suspicion that these berries too may be somewhat harmful, but they seem to be much less so that those of *Solanum dulcamara.* Incidentally, these two plants illustrate one reason why botanists prefer scientific names.

The common name, bittersweet, is given to two totally different, unrelated plants, which can lead to much confusion. In case of suspected poisoning by plants it is critically important to know precisely what plant is involved. Proper treatment can depend on the right information.

Like the Nightshade family the Carrot or Celery Family (Umbelliferae) contains a large number of useful plants—carrots, celery, parsley, parsnips, coriander, caraway, dill and fennel among them. Also like the nightshades, the umbellifers have toxic members, some of them violently so. Most of these are wild plants, but one of the most poisonous is sometimes cultivated as "flowering fern." This is the notorious "poison hemlock" *Conium maculatum,* used to execute the Greek philosopher Socrates. Here again there is a confusion of common names. Poison hemlock has absolutely nothing in common with the hemlock tree of northern forests. Poison hemlock is a biennial herb which can reach six feet or more in height, with finely cut, fernlike leaves and large flat clusters of small white flowers resembling oversized Queen Anne's Lace. All parts of the plant contain the dangerous alkaloid, coniine. Water hemlock *(Cicuta maculata)* grows in wet places, has coarser leaves than poison hemlock but similar flat clusters of minute white flowers which are characteristic of most members of the family (some have round heads rather than flat). It produces clusters of roots somewhat resembling

parsnips which are said to have a pleasant taste, but, cooked or raw, a few mouthfuls can be fatal. Campers living "on the land" and wild food enthusiasts are most apt to get into trouble from these plants. While there are edible wild members of the carrot family, it is so easy to confuse them with the toxic ones they should be let alone.

A number of familiar ornamentals can be dangerous if eaten. One that is very widely grown in warm climates and fairly often used as a tub plant in the North is oleander *(Nerium oleander)*. This shrub or small tree with abundant long narrow leaves and clusters of beautiful flowers in white, cream, pink or red, contains a powerful cardiac glycoside. One leaf, chewed and swallowed, is capable of killing an adult. Children can be made ill by trying to suck nectar from the flowers, and at least one case is reported in which several people were made very ill by eating frankfurters which had been spitted on oleander sticks and roasted over a fire.

Many varieties of yew *(Taxus* spp.) are widely used in northern areas; they are one of the most frequently used plants for evergreen foundation plantings. All parts of these plants are poisonous except the soft red material (technically an *aril*, beloved of crossword puzzle authors) which surrounds the seeds. These seeds are the part most apt to appeal to children and unfortunately, they are very likely to swallow not only the non-poisonous arils, but the enclosed seeds themselves, and these *are* toxic.

One really dangerous plant which is often grown because it gives an exotic, tropical look in northern gardens is the castor bean, *Ricinus communis*. This plant can reach heights of eight to 10 feet in one season and has handsome large, palmately lobed leaves which are its attractive feature. Late in summer it may produce clusters of insignificant flowers, which are followed by spiny, burr-like fruits. These split open to release two to four bean shaped seeds which are the dangerous part of the plant. These seeds are the source of castor oil, formerly widely used in medicine though less so now, and still a valuable lubricant. The watery part of the juice of the seeds contains a phytotoxin, ricin, which is one of the most poisonous substances known. One castor bean contains enough ricin to kill a small child, half-a-dozen could kill a grown man. It is advisable if these plants are grown as ornamentals, and especially if there are small children around, to remove the flower clusters which add very little to the beauty of the plant, before they form seeds.

The Rose Family, Rosaceae, provides us with many beautiful ornamentals, and in the North Temperate Zone at least, gives us more fine dessert fruits than any other single family of plants. Among these are apples, pears, peaches, plums, almonds, cherries, strawberries, raspberries and blackberries. Most members of this family are benign, but even among these treasured plants there are one or two points to remember. The seeds of a number of them, especially the kernels in the pits of the so-called stone fruits, e.g., peaches, plums, and cherries, contain cyanogenic glycosides. Eating these kernels in any quantity could be dangerous. Even the bitter varieties of almonds should be used sparingly, though the ordinary ones are safe. Apple seeds contain some of the glycosides, but in small amounts. Eating the seeds of one apple would not likely cause any harm, but one man who developed a taste for them saved a cupful and ate them at all one sitting with fatal results.

So far we have talked about a number of plants most likely to be encountered that might cause trouble, if eaten. The presence of these plants in our midst is no cause for alarm, but does call for a few common sense precautions. Children are most likely to get into trouble because of these plants, so they should be taught as emphatically and as early as possible never to put plant materials into their mouths. Very small children must be watched when they are any place where these plants might be found. In the unhappy event that a child does become ill and ingestion of a toxic plant is suspected, get to a doctor or a hospital immediately and make every effort to bring samples of the material to help in identifying it. As already mentioned, such identification is very important in the proper treatment of the problem. Most large cities have poison control centers to assist and advise in cases of all kinds of poisoning. It is wise to have the telephone number of the nearest such center readily available.

Adults, as well as children, should never ingest plant material unless they are certain it is harmless. Wild food foragers, especially, should learn to accurately identify anything they plan to harvest in the wild. This is emphatically true in the case of mushrooms. We are not discussing these in detail here; this is a whole subject in

itself. Just remember that there are no simple rules of thumb or tests that distinguish toxic from edible fungi. And keep in mind the old saying, "There are *old* mushroom-eaters and there are *bold* mushroom-eaters, but there are no *old, bold* mushroom-eaters."

We will conclude this brief survey of poisonous plants with a discussion of one group which, while seldom causing death, is responsible for more discomfort and misery than any other—poison ivy and its relatives, poison oak and poison sumac. These plants cause dermatitis in sensitive persons on contact, and this can range from a mild itchy redness to very severe blistering and raw lesions. Individual reactions to contact with these plants is very variable, some people having no reaction at all, others reacting strongly to the least contact. And sensitivity can change. In general, contact with the plant *increases* one's sensitivity, so in time seemingly immune persons may acquire sensitivity. The effects are caused by chemicals in the sap of the plant, which unite with proteins of the skin and induce an over-reaction of the immune system. No one reacts to the very first contact with these plants; and no one knows why this initial contact highly sensitizes some individuals while repeated contacts are necessary to sensitize others. The amount of the chemical needed to induce a reaction in sensitive people is incredibly small. The substance is not volatile, so it is not true that just coming in the vicinity of a plant can cause a reaction; but if it gets on one's fingers every spot the fingers touch can react. Clothing that has contacted the plant can carry the chemical for a very long time. One woman seemed to get ivy poisoning every spring; she attributed it to the budding and renewed growth of the plants even though she never touched them. It turned out she had a special old sweater used only for early spring gardening. This sweater had at some time come into contact with the poison ivy and the chemical remained on it. Pets running through the plants can pick up the poison on their fur and pass it on to their masters, and while it is true that the material cannot drift through the air, when the plants are burned it can be carried by the solid particles of the smoke. Great care must be taken not to put these plants on a bonfire, or if one does so, to scrupulously avoid the smoke. Inhaling the particles can cause severe and even fatal inflammation of the lungs.

Toxicodendron vernix, *poison sumac, is resplendent in the fall. It grows in wet, swampy areas so is not as likely to be encountered. It is a small shrub growing 10 to 15 feet tall.*

Everyone should learn to recognize these handsome but malevolent plants as one or another of them can be found in almost every state of the continental United States. For a long time there has been confusion about the names used. Is poison oak only a variety of poison ivy or a separate species? Should they be classed as species of sumac *(Rhus)* or put in a separate genus? At last it has been more or less generally accepted that the poisonous plants should be separated from the non-toxic ones as the genus *Toxicodendron*. This leaves the harmless sumacs in their own genus, *Rhus*. Also, there are now considered to be two poison oaks, a western species *(Toxicodendron diversilobum)* and an eastern one *(T. quercifolium)* as well as poison ivy *(T. radicans)*. Finally, we have poison

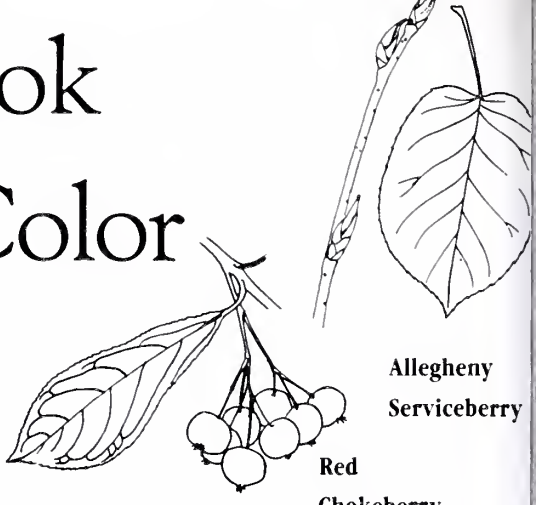
sumac *(T. vernix).*

Fortunately for the layman the poison oaks and poison ivy are so similar that he need not worry about distinguishing them. All are woody plants which can be shrubby or climbing and which have leaves with three leaflets. These leaflets may have smooth margins or have a few large blunt teeth or be somewhat lobed. The poison oaks have more prominently lobed leaves than poison ivy. Flowers are small and insignificant, followed by clusters of ivory or white berries. These have on occasion been mistaken for mistletoe, sometimes with unfortunate results. The leaves often show beautiful fall colors and this also has sometimes mislead the unwary.

Poison sumac fortunately is nowhere near so ubiquitous as poison ivy and is only likely to be encountered in wet, swampy areas. It is a slender shrub which grows to 10 or 15 feet tall and has leaves with seven to 13 pinnately arranged leaflets, very similar to the more common, harmless smooth and staghorn sumacs. In addition to their different habitats, poison sumac is distinguished from the harmless ones by its berries which are white and borne in loose, hanging clusters. The non-toxic sumacs produce red berries in compact, conical, upright clusters.

It is not possible in an article of this length to discuss or even mention all of the plants which can cause trouble when eaten or contacted. But we have looked at a number of those most likely to be encountered. Remember, there is no need to be alarmed by the presence of these plants, many of which are beautiful and even useful. Simply follow a few rules of common sense. Never eat any plant or plant part unless you know for certain that it is good, or at least harmless. If there is any doubt whatsoever, do not eat! And always be watchful of children, teaching them never to put things in their mouths that are not acceptable. ✡

A New Look at Shrub Color



Allegheny Serviceberry

Red Chokeberry

Michael A. Dirr

A varied array of deciduous shrubs offers kaleidoscopic fall colors over a number of months. There is a shrub to fill a niche in every garden.

Two native shrubs with almost surrealistic colors are dwarf and large fothergilla, *Fothergilla gardenii* and *F. major*. Native to the Southeast and hardy to Boston (Zone 5 and colder regions), they offer brilliant collages of yellow, orange and red in the fall. Often all colors are interspersed in the same leaf and no two plants appear the same. The dwarf fothergilla grows three feet tall; the large six to nine feet tall.

Both shrubs are densely branched, somewhat prone to put out suckers, and tolerate full sun to half shade. They should have moist, organic, well-drained soil. In spring they produce honey-scented white flowers one to two inches long on naked branches. Often flowering about the same time as the kurume azaleas, these shrubs can be used to soften the azaleas' harsh salmons, oranges and reds. (Sources: *F. gardenii:* W, EPS, WG; *F. major:* W, EPS.)

Closely related species include *Hamamelis mollis*, the Chinese witch hazel, and *H.* x *intermedia*. The first has four spidery, strap shaped, fragrant, golden yellow petals in February or March, and rich golden fall color. The latter represents a cross between *H. japonica* and *H. mollis*, and is intermediate between each parent in characteristics. Among the numerous cultivars, 'Arnold Promise,' 'Diane' and 'Jelena' are among the best. 'Arnold Promise' has clear yellow flowers (Sources: CG, EPS, WG), 'Diane' has red flowers (EPS) and 'Jelena' has copper flowers (EPS).

All the witch hazels offer a rich assortment of yellow-orange and red hues in autumn. They flower most prolifically in full sun, but also perform well in shade. Since their mature size is 10 to 15 feet or larger, a position in the back of a border or at the edge of a woodland is recommended. Most plants are grafted and the gardener must be wary of suckers (shoots from the understock) that can take over. Also, graft incompatibilities often occur as plants decline in vigor over a number of years and eventually die. Ask for plants grown on their own roots.

At first glance, *Disanthus cercidifolius* looks more like a redbud than a member of the witch-hazel family. Its large, glossy, heart-shaped leaves would fool even the most taxonomically inclined. However, the autumnal combinations of claret-red and purple, often suffused with orange, are testimony to another species. The growth habit is shrubby, seldom over 10 feet. Disanthus prefers moist organic soil in full sun to partial shade. (Sources: EPS).

A new form of the burning bush, or winged euonymus, is called 'Rudy Haag' (FF, WA). Offering excellent fall color, it grows no taller than five feet at maturity. For mass groupings, hedges or combinations with rhododendrons and azaleas, it is a delight.

The native serviceberries *(Amelanchier)* are in great demand, for designers have discovered their landscaping worth. Early, fleeting, fleecy white flowers; edible blueberrylike fruits; rich

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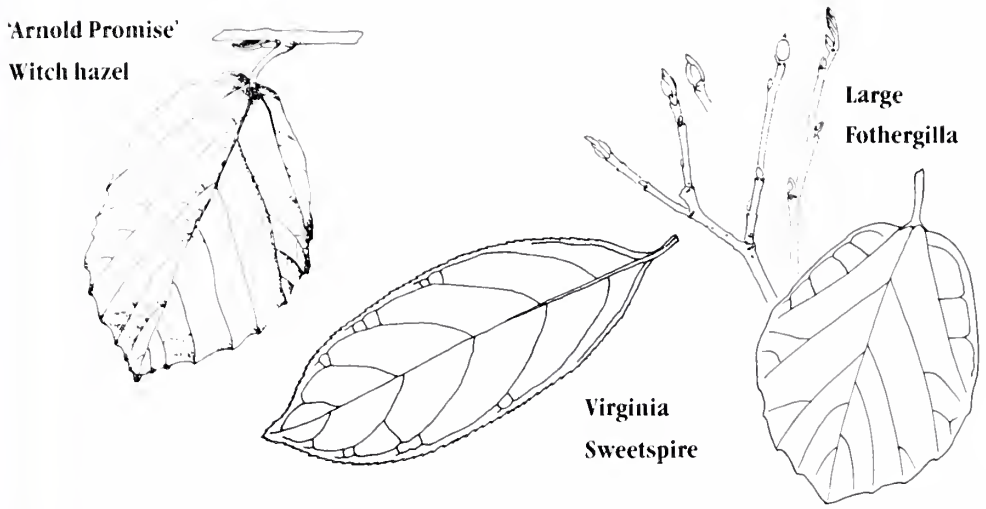
Michael A. Dirr is Professor of Horticulture, University of Georgia. Dr. Dirr has written books, papers and he often lectures.

Drawings from "Manual of Woody Landscape Plants" by Michael A. Dirr



autumn tints ranging from clear yellow to apricot to brilliant red, handsome gray striated bark, and climatic adaptability have heightened their popularity. *A. canadensis,* or shadblow serviceberry, *A. laevis,* or Allegheny serviceberry, *A. arborea,* or downy serviceberry, and *A.* x *grandiflora,* or apple serviceberry, are the best of the group for Northeastern landscapes.

Several enterprising nurserymen have selected forms for outstanding fall color. 'Autumn Brilliance' and 'Princess Diane' have brilliant red fall color and are among the best for consistent fall coloration. 'Cumulus' is a widely available form with bright yellow-orange to orange-scarlet fall color. *(Amelanchier canadensis,* FF; 'Autumn Brilliance,' W).

A wonderful native species with limited name recognition even among seasoned gardeners is *Itea virginica,* or Virginia sweetspire. A graceful, mounding, arching, semievergreen three to five feet high, it has a penchant for moist soils and shady conditions. It is also content in drier soil conditions and full sun. With the advent of cool weather the leaves assume purplish tints that darken as the cold intensifies. Leaves may persist into early December in Northern climates and sometimes throughout the winter in Southern gardens.

A promising new selection is 'Henry's Garnet,' which was selected from plants growing on the Swarthmore College campus. This form promises a richer, almost fluorescent, reddish-purple fall color. The plant is easily propagated by cuttings and division. One plant in the hands of a skilled gardener will soon multiply to 100 for distribution to friends. (W, EPS).

With a name like 'Norman,' a dwarf spirea has to have a great deal in its favor. The literature describes it as growing 10 inches tall, with pink flowers and red fall color that persists for a month. In a Pennsylvania garden as late as early November the reddish purple fall color was still in evidence. The shrub is a form of *Spiraea* x *bumalda* but may be closer to *S. japonica* (CG).

'Brilliantissima ' means most bright, and this selection of *Aronia arbutifolia* or red chokeberry is just that, endowed with brilliant red fall color and abundant red fruits. A rapid grower with a suckering tendency and a size limit of six to eight feet, this plant is great for stabilizing slopes or garden areas that are difficult to maintain. Tolerant of sun or shade, and adaptable to moist or dry soil, it can fit many garden situations. The fall color is almost cherry red and rivals winged euonymus.

These represent but a few of the wonderful shrubs that offer superb fall color as well as other seasonal attributes. They are treasures that can be assimilated into every garden. Not readily available at cash-and-carry garden centers, most are obtainable from the sources listed. ✿

Sources

(CG) Carroll Gardens, Box 310, 444 East Main Street, Westminster, Md. 21157, catalogue $2; (FF) Forrest Farm, 990 Tetherath, Williams, Ore. 97544, catalogue, $1; (GF) Gossler Farms Nursery, 1200 Weaver Road Springfield, Ore. 97477, catalogue, $1; (WG) Wayside Gardens, Hodges, S.C. 29695, catalogue, $2; (W) Woodlanders, 1128 Colleton Avenue, Aiken, S.C. 29801, catalogue, $1.50, and (EPS) Eastern Plant Specialties, P.O. Box 40, Colonia, N.J. 07067, catalogue $2.

Uncommon plants can bring unusual success

James E. Cross

The following is based on a seminar James E. Cross, the owner of Environmentals, Cutchogue, NY, presented at the Massachusetts Nurserymen's Association in 1985.

There are many ways woody ornamental plant producers can develop solid product lines. One profitable approach is to concentrate on unusual plants—those plants that, for some reason, are not produced by the vast majority of well-established nurseries. This focus should be of particular interest to new growers or employees thinking about going on their own.

Daphne *'Carol Mackie' in the foreground is quite attractive but difficult to find in nurseries. Tissue culture may be the answer to the problem of propagating this plant.* Acer palmatum *'Dissectum Atropurpureum' is in the background.*

Cystisus kewensis *is a low-growing broom which stays below one foot in height. It bears creamy-white or pale yellow blossoms in late spring. Brooms prefer not too rich soil.*

A product line of unusual plants may seem to entail the extra risks and uncertainties associated with following an untried path. Why then should a grower—especially a new, less-experienced one—pursue this venture?

There are many reasons. But to see them in perspective, I want to first review two basic characteristics of producing woody ornamentals.

The most important is the long production time. In fact, this one attribute separates plant production from all other industries.

James E. Cross is the owner of Environmentals, Cutchoque, N.Y. His wholesale nursery specializes in unusual woody ornamentals.

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The long time between your decisions concerning what and how much material to propagate and the point of sale makes product selection critically important. Your policies concerning selection are also crucial. The time delay demands that you pay extraordinary attention to your market so that you thoroughly understand it.

The second important characteristic is the highly segmented nature of the nursery industry. It comprises many small, local units, the largest of which are small by most other industries' standards.

There are some rather fundamental reasons for this—and, incidentally, why this will remain so despite the fairly regular predictions that large, specialized growers will take over the industry. In any event, well-run, small local units will always be able to compete quite successfully in this industry.

With these basic facts in mind, I propose that selecting, growing and marketing unusual plants (if accomplished at all well and with a modicum of common sense) entails not more but less risk than offering the materials well-established growers produce.

Little Risk

The risk is lessened in a number of ways. As a grower of unusual plants, you face less direct competition from well-entrenched nurseries.

In selecting new plants, you can set a pace that is comfortable for you, one that fits whatever search and evaluation procedures you use.

There are plenty of new plants waiting for you to grow and promote them. Few competitors will be chasing you and copying your good selections. At the worst, you will have a long lead time before others follow suit and create real competition in your particular market.

With products that have less competition, you can exercise more control over your prices, thereby assuring you of a profit. With unusual plants, if you're not paid enough for your own work, it's your own fault. After all, the only pricing restriction of consequence is what consumers are willing to pay for particular plants. If you have judged a plant's ornamental qualities well, this shouldn't present a problem.

The differences of your unusual plants give you an extra selling tool. They make your life easier, not more difficult. Even if you have a small or new nursery, you can attract more attention than your size or age warrants if you sell unusual plants. This makes your merchandising effort a bit easier. You have more to sell.

By emphasizing unusual plants, you can have a considerably wider product line than you can by following the mainstream of production. You are also not as likely to produce large quantities of an individual plant, a practice that puts some growers way out on a limb.

Therefore, you are prone to fewer major marketing casualities, especially those resulting from a large competitor's overproduction. In effect, your more numerous but smaller marketing or production mistakes tend not to be concentrated into episodes of financial stress.

Some Other Benefits

With total production spread over more plants, your marketing logistics are more, not less, manageable. You do not need to go a great distance to sell your total inventory.

By staying local, you can gain additional competitive advantages. You can develop and maintain a better feel for your market. Your customer communications—and, therefore, your customer relationships—are better. You are not quite so dependent on some factors that are out of your control, such as commercial carrier freight rates and weather patterns in distant places.

A broad product line is also a lot of fun for you and the people who work with you. There is less monotony and boredom than there is with specialized product lines. And better conditions create better attitudes and better productivity.

If your nursery is not huge and your manager is sufficiently alert and skilled to reduce worker specialization, you will see a startling reduction in employee turnover. This reduces personnel costs considerably. This, in itself, generates additional money to pay living wages and still come out ahead in your own compensation.

These benefits are just a few of the many advantages a product line emphasizing unusual plants offers. This approach, however, is not for everyone. For it to work well, you need a certain mental attitude—one that prevails in a number of managerial functions, especially in:

- Developing the product line.
- Producing the inventory.
- Merchandizing and marketing.

Selecting Unusual Plants

Developing the product line involves locating and selecting new plants. This task calls for a definite mental attitude and probably the most difficult adjustment from the norm.

The first logical question to ask when developing a line of unusual plants is, "Where do I find new product candidates?" The answer, though it may seem flippant, is anywhere and everywhere. There are more than ample prospects out there. In fact, there are more than you can ever get around to. And this does not count new discoveries or controlled breeding.

If this concept seems implausible, examine the reasons why so many really good, useful ornamentals are not readily available in commercial markets (sidebar, p. 24). The most obvious unusual plants are those that aren't generally available because they are new to garden usage.

The first source of this category of candidates is controlled hybridization. Amateur enthusiasts and full-time geneticists have created many now familiar examples.

Many new candidates also come from new discoveries and selections in the wild, both in this country and abroad. Whether created by man or Mother Nature, the vast majority of new

woody plants are selected based upon other factors besides commercial motivation. And they are available to anyone who stays alert and seeks them out.

Another source is the careful selection of promising variants from crops grown from open-pollinated seed. You can institute your own profitable program, especially if there is a good market for the plant's regular form. Or keep in close touch with other nurseries. Most patent or narrowly control only a few of the good selections they make. And the local nature of most nurseries limits their competition for your sales in your area.

Sometimes, you can make candidates of readily available plants by giving them additional ornamental utility. You can do this by changing the plant or by changing your marketing method. For example, produce smaller, less-expensive sizes. Or grow larger, quite-scarce sizes, such as three- to four-foot large-leaved rhododendrons. Or reshape plants into espaliers, "poodles" or topiaries.

The foliage of Daphne *'Carol Mackie' is delightfully variegated providing interest in the garden even when not in bloom.*

Finding Unusual Plants

Another logical question is, "How do I find these candidates?"

The answer is to become an active participant in the entire process. Expose yourself to as many plants as possible. Get involved in activities that can provide new ideas. Be aware of and get involved in your own commercial industry as well as other facets of ornamental horticulture.

Read all sorts of publications dealing with horticulture. Acquire books and magazines, and keep them where you can use them when time permits. You cannot read everything carefully. Teach yourself to skim them for new ideas. Sometimes, ideas are blatantly presented. For example, one may be on a front cover. However, ideas show up more often as small comments or pictures buried inside.

Do not restrict your reading to only one growing publication. Skim through florist publications and those aimed at retailers. Look at "Garden Design" and other publications for landscape architects. Read all the consumer horticultural magazines, including those from England and other countries. Be certain to read

Rhododendron bakeri *has excellent form. Flowers are an orange-red. There is often a tremendous time lag between the introduction of new plants and their distribution.*

things like "Avant Gardener," which is a digest of items from many publications and a good mental reminder of items you have seen elsewhere.

Each of these publications covers different sources and markets, but they all relate to your search for unusual plants.

Nursery catalogs from all over the country are also good sources for product ideas, and they provide a good sound perspective for judging which plants are in limited supply.

And do not overlook the regular offerings of commercial propagators and liner growers. For the most part, you want to be able to do your own propagation. But keep a close eye on their catalogs. Liner suppliers try hard to maintain a steady inflow of new plants to brighten up their lists. And it pays to look carefully at trade shows for the featured plants of exhibiting growers.

You should join all the active general horticultural societies, like the American Horticultural Society. And join your local society even if you cannot attend many meetings.

You should also join pertinent specialized societies, such as the American Rhododendron Society, the American Rock Garden Society and the American Conifer Society. Read their publications and offer them whatever support best suits the situation. If nothing else, help these organizations when they have plant sales to bolster their treasuries.

Gardens

It also pays to be an active gardener. It may not be critical to your success, but it helps keep your perspective close to that of the consumer. The closer you come to that point of view, the better your product judgments are. Gardening helps you understand the customer and your products.

Find the time to get out of your nursery and visit arboretums—and not just the local ones. Whenever you go elsewhere on any sort of trip, look for a nearby arboretum. Introduce yourself to the key people there, and let them know your particular interests. Help them by joining their support groups, furnishing plants when needed and participating in their educational programs when asked.

Find ways to visit private gardens as well. Many gardens are open to organized tours or on designated open-house days. People greatly

enjoy showing off their favorite plants and are glad to relate their experiences with them. This is an excellent source of solid information on all sorts of plants, including some already in your product line.

Do not forget to develop a good relationship with your state's cooperative extension service. Again, offer your support when it is needed. You will get plenty of help in return.

Other Perspectives

Developing good relationships with a wide array of people of different horticultural bents takes time, but it is very worthwhile. It is amazing how many new plant ideas you get when there are a lot of other people looking for them because they know your purposes and needs. In addition, you receive the great bonus of meeting many of the unusually fine people attracted to horticulture.

Sharing is one simple way to build a wide active network of contacts. As your experience increases, actively and willingly share the knowledge you accumulate. Do this formally via educational programs and informally in your nursery and elsewhere. This effort may seem indirect, but it is right on target. You get back more than you put in.

For example, never hesitate to share your cuttings, seeds or scions. You get back 10 for one in the long run.

In developing introductions, avoid being proprietary. The vast majority of woody plants are in the public domain and will continue to be so. It is not only easier but more productive to select your candidates from this vast majority of Mother Nature's bounty.

You narrow your choices severely if you confine them to the limited numbers that you can control by patent. The same is true if you try to play your cards real close to the vest.

Patents and royalties can play a logical role in financing and compensating planned plant breeding programs, but they have no legitimate place in the chance identification of one of nature's promising variants.

The most important ingredient that you can bring to your search for unusual plants (next to objectivity) is a positive and interested attitude toward ornamental horticulture and those areas of your special interest. Let others see this attitude (do not try to squelch it), and they will pass their ideas on to you.

Many ideas will be off track, but if you get one good idea each year from each source, you will be inundated with new products. The rest is easy!

Choosing Among the Candidates

As early as possible in the process of developing a new product line, you should develop specific criteria for selecting new products for your nursery. These criteria should be clearly defined to ensure maximum usefulness.

Be assured that you will eventually have many, many candidates—so many that it can become quite confusing. Each decision can be a real chore unless you have a solid framework of criteria on which to base it.

In the selection process, the most important management ingredient is objectivity. You need to discipline yourself to see plants through the consumer's eyes. Avoid looking at them with the eyes of an avid plant enthusiast or collector.

If possible, plant your candidates in your own garden. Place them where you see them regularly, in and out of season. If they are good candidates, you will see it. If they have problems, you will learn them.

If you find yourself regularly drawn toward a certain plant as you walk among your candidates at varying seasons of the year, you have a good prospect for a new product. You can be fairly certain that consumers will also be attracted to that plant for the same reasons.

Take retailers, friends, fellow gardeners and nurserymen through your evaluation beds. Note their responses to particular plants. One positive response doesn't make a commercially viable product, but two heads you in the right direction.

Growing Unusual Plants

Propagating and growing unusual plants are much the same as they are with a diverse line of common woody ornamentals. However, a few management aspects call for special emphasis.

You want to develop above-average experience and skill in propagation. In many cases, no one is available to advise you on the best means of reproducing a particular plant. And if you confine your new product candidates to plants found already propagated in the trade, you severely limit your choices.

You should have flexible propagation facilities. Be ready and willing to propagate from

seeds, hard or soft cuttings, and grafts. It also wouldn't hurt to have a friend somewhere who could try to tissue culture some plants for you if the need arose.

If you are starting up a new operation or can determine your nursery's production scheme, grow your plants in containers rather than in the field. With modern container culture, you can profitably and efficiently grow an unusually wide assortment of ornamental plants. Also, it is simple with container growing to trial run a few plants through your production process. It is also easy to assimilate single candidates into your production schedule with less risk.

Normally, you will start an unusual-product line with a small quantity of one new plant. Frequently, you have a few unrooted cuttings or scions. So you have to propagate this material before it ever reaches the garden or trial area for observation. If you get a single small plant, propagate a few additional plants before putting the original into a trial area.

In any event, a trial run allows you ample opportunity to learn how a plant (albeit in small quantities) progresses through your production well before you have to decide whether it is worth adding to your line.

For a trial to work well, you should be observant often. You should also keep accurate records for reference. Track propagation, transplanting and growing on. The best of memories cannot match written records for recalling exactly what happened.

Marketing Unusual Plants

A final question is, "How do I talk customers into buying plants they know little about?"

The task appears much more difficult than it actually is. If you do everything else up to this point reasonably well, marketing is not a big problem, especially if you sell primarily to garden centers.

If you are objective in your selection procedures and grow and package your plants well—with good attention to detail—homeowners will pick your plants.

Keep in mind that retailers are interested in selling your plants at their preferred markup. Most are willing to give space to plants that

Cystisus kewensis *is shown here in bud. The ground-hugging form of this broom is more obvious when not in full bloom.*

promise resale regardless of their names or demand.

Put your plants into retail sales yards just before the seasonal peak of their ornamental features.

If a plant looks good to potential customers, you do not have to rely upon requests for it by its botanic name. Allow an appealing plant to do most of the selling for you. Avoid distractions such as muddy containers, weeds, black instead of green containers, containers that are out of proportion to the plants, or plants that are potted too low.

Use every natural opportunity you have to ease the way for new introductions. You have plenty of time to acquaint retailers with the products coming through your production schedule. Do not hide new selections from these customers because you haven't completed your evaluation. Remember the long production cycle, and use that time to your advantage. Your customers' preliminary reactions should be a part of your evaluation.

Start Small

Most often, you start to sell small quantities of plants at first. So you do not need a big initial advertising splash. A small nursery does not need a large quantity of plants widely promoted to introduce a new product.

A better idea may be to test market an introduction with a few well-established retailers. Once you decide to sell an initial crop, propagate a limited number, maybe 50 or 100. This may be about all the wood available to propagate at this early stage. Let each retailer have five or ten to try to sell. They will not hesitate with so little at stake.

During the following year, propagate 100 to 200. Gradually increase your production if your initial sales indicate your selection was on target. In this manner, your risk will be low until you have some encouragement from resales and customer commentary.

In the meantime, you need not worry about the competition beating you to your market. The nursery industry is slow to change products primarily because of the long production cycle. But occasionally, you may have to move more quickly than usual, such as when you work with an easy-to-propagate, fast-growing plant with striking blue foliage.

There is one factor that can often mislead you in the production of new products. A very small crop of a new, eye-appealing plant is easy to sell. But at some point, you have to adjust your production and be patient.

There is a definite lag between initial impulse sales to avid plant collectors and sales to people who saw the plant elsewhere. You could probably shorten this lag with active promotions, but it is not all that critical once you have a regular succession of new products coming into production.

Education

There are, however, a few ways to help the introduction process along. One is to condition yourself to consider education at all times even though short-term concerns may sometimes make this seem a nuisance or unnecessary interference. Tell your customers what you have learned about the plant's cultural preferences and eccentricities. Suggest how to make the best use of its ornamental features.

When selling to retailers, find practical ways to get information to their salespeople on the firing line. One effective method is to spend an hour or two with the sales force after you have delivered your plants but before the spring avalanche begins. A telephone conference call is another way.

Refer salespeople to backup reading material so those with extra interest and curiosity can be satisfied. Also, label each plant, and pack the tags with helpful information.

You should educate the public as well as the retail sales forces. Be willing and prepared to accept speaking or writing engagements for legitimate groups of potential consumers. Encourage legitimate interest in your nursery through tours. Actively support community events, such as flower and garden shows, where gardeners come to learn. This is another audience for your message. Often they will pay admission to hear your message.

Remember, the single most important element in marketing a new product is you. Your own positive attitude is a key factor to an introduction's success. You must be thoroughly convinced of the plant's ornamental value. The potential demand for your plant is there, and your market is inherently hungry for new, better varieties. It takes only a well-organized, common-sense effort on your part to capitalize on these conditions. ❊

Why are so many good plants rare in the nursery trade?

Quite a few attractive, useful plants fall into the category of unusual because they are not generally available in the commercial trade. Although many of these plants could be profitable, there are many reasons well-established nurseries do not grow them.

Many plants are not generally available because they present some obstacle to being propagated in commercial quantities. A few examples are *Daphne* (daphne), *Acer griseum* (paperbark maple) and *Arctostaphylos uva-ursi* (common bearberry). *Kalmia latifolia* (mountain laurel) is also a good example, but the obstacles to its propagation are slowly being overcome by tissue culture.

The opposite condition often has the reverse effect. Commonly available and easy-to-propagate plants, like *Ilex crenata* (Japanese holly) and azaleas, are frequently overproduced.

Slow Growers

Some plants are not generally available because they simply grow too slowly. They seem to take too long to produce sizable plants. A few examples are *Rhododendron yakusimanum,* the queen of all rhododendrons; *Kalmia latifolia* from seed; *Sciadopitys verticillata* (Japanese umbrella pine); and dwarf, slow-growing plants in general.

Alert growers who find practical solutions to this problem have solid new products with built-in demand. Solutions include finding a good market for young, small plants or developing a technique for reducing the normal production time.

Some plants are not generally available because of cultural fussiness. They are not easy to cultivate in the nursery or the garden. Two examples are *Daphne cneorum* (rose daphne) and *Epigaea repens* (trailing arbutus). In the Northeast and inland, *Calluna vulgaris* (heather) is another case.

Other plants do not fit the criteria of nurseries that heavily emphasize specialization. These growers often assume that certain plants do not create mass demand and, thus, are not worth the effort. As a diversified grower, you can use this specialization fervor to great advantage.

Small Demand

Some plants will always have quite a limited demand. Such is the case with the very dwarf *Ilex crenata* cultivars 'Dwarf Pagoda', 'Green Dragon' and 'Piccolo'. The very dwarf cranberry *Vaccinium macrocarpon* 'Hamilton' is another good example.

Some plants have too specialized a use to generate mass demand. This is true of the winter-blooming *Hamamelis* (witch hazel) and the dwarf *Syringa* (lilac).

But plants of limited demand are still useful. And in containers, a crop of 200 to 400 should be profitable, especially since you have slightly more control over your prices than do mainstream growers.

Some plants are not generally available because their ornamental qualities are not understood or appreciated—even though the plants have been around for decades. Examples include *Paxistima canbyi* (cliff-green), the winterberry *Ilex verticillata* 'Red Sprite' and *Rhododendron prunifolium* (plum-leaved azalea), which is considered a tender Georgia plant.

Delays

Some plants are not available because there is a tremendous time lag between introduction and distribution. Plants can perform well and be discussed for a long time before they appear in local garden centers. Many large-leaved rhododendrons introduced 30 to 50 years ago are just now becoming readily available.

Rhododendron bakeri *is a southern species of azalea — there can be a great deal of variation in this species.*

Among the lepidote rhododendrons, 'P & M' and 'Purple Gem' are well-known, but 'Windbeam', 'Mary Fleming' and 'Dora Amateis' have become common only recently despite being introduced quite a while ago. These three rhododendrons have been good opportunities for alert nurserymen for at least 20 years.

Yet the marketplace and wholesale suppliers haven't even begun to think about the next couple of generations of small-leaved rhododendrons which have been long since named and introduced.

Pushed Aside

Sometimes plants are not available because growers pass them over for newer hybrid forms, which often provide entirely different ornamental qualities. Native azaleas, such as *R. calendulaceum* (flame azalea) and *R. vaseyi* (pink-shell azalea), are often neglected, as are a number of rhododendrons, especially among the lepidotes.

Once-popular plants are sometimes forgotten in the rush to try newer hybrids. This seems to be happening to one of the best evergreen azaleas, *Rhododendron mucronatum* (snow azalea), and to *R. m. album*.

Sometimes, there doesn't seem to be any visible reason for a plant's unavailability. *Rhododendron schlippenbachii* (royal azalea) is a classic example, as is *Ilex pedunculosa* (long-stalk holly).

Sometimes the unusual-plant grower's best opportunity exists for about the first decade of the plant's commercial life before its potential for mass demand is fully recognized. A few decades back, *Juniperus horizontalis* 'Wiltonii' was an outstanding example. Much more recently, *Juniperus chinensis procumbens* 'Nana' fit this bill. It took many years before these junipers were broadly recognized and wholesale growers had built up their production.

Espalier:
Sculpted Fruit Trees For Tight Spaces

Planting and Pruning

Jack Ruttle

What got me dreaming some four years ago about espalier—growing fruit trees trained flat against walls and wire trellises—was my own backyard, which is too cramped for even the dwarfest trees. But, having always been eager to try my hand at all sorts of gardening, I just could not squeeze tree fruits—especially apples—from my plans. So my eyes turned to the potential vertical space on my narrow (20-by-90-foot) property's borders. However, the mechanics of installing and training an espalier posed more questions that I could answer satisfactorily, and my latticework bedecked with russet, aromatic fruit remained a fantasy.

Then, last year, my wife's education took our family to England, where espaliered fruit gardens abound. While there, I decided to learn exactly how to set up a few ranks of trimly trained fruit trees so that I could turn my espalier daydream into reality when we got home.

Keeping a healthy tree confined to a maximum height of six to seven feet and growing as a dense, fruit-bearing hedge less than a foot thick requires certain skills, I found. But regular attention with the hedge shears or hand pruners plays little part in it. Success with espalier depends on the use of dwarfing rootstocks, a simple trellis and summer pruning, which might be better termed "pinching," since it involves very little wood removal.

It quickly became clear that the best way to start is with apples or pears. These fruits are closely related and tend to form fruit similarly—on short, slow-growing branches called spurs. It is not in a spur's nature to send out long, hard-to-control vegetative shoots. The stone fruits (peaches, nectarines, apricots, plums and cherries) are a bit harder to keep in bounds. No truly dwarfing rootstocks are available for most of these fruits. Moreover, they tend to bear on two-year-old wood or short-lived spurs, and push out too much succulent growth for a neatly trained espalier. They aren't the best choice for really tight spaces or the novice espalierist.

Settling on a Shape

Accomplished gardeners have worked espaliers into wondrous forms, but these are not the thing to start with. Virtually everyone I spoke to said to pick a location for the planting first, then determine a compatible shape. A single, straight run of branch is called a cordon, or arm, though to some people a cordon is a tree that has been trained in a straight line, with no branches. Basically, there are three directions in which a cordon can grow: vertically, horizontally or at some angle in between. Horizontals are the hardest to work with, since more than anything else the plant wants to shoot straight up. Verticals and angled espaliers are better choices. And for easy care and best fruiting, the angled forms have the edge.

You can cover a given space with single cordons or with a smaller number of trees (perhaps

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Jack Ruttle is a senior editor for Rodale's Organic Gardening. *He writes on various gardening subjects.*

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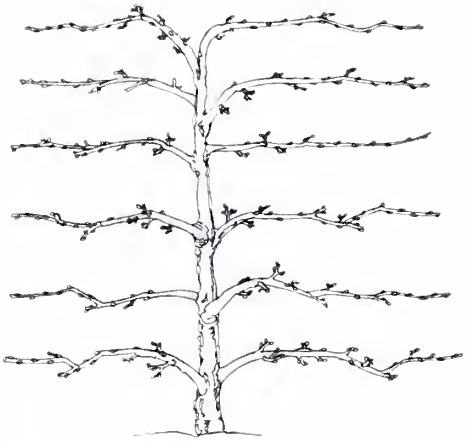
Vertical cordon

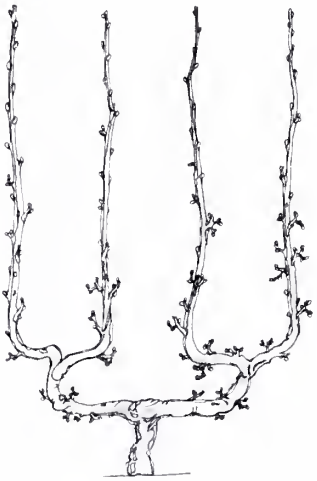
Horizontal cordon

Flights Of Fancy

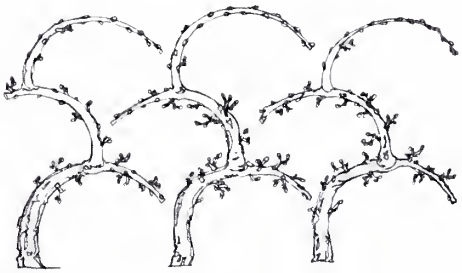
A few basic techniques can produce a limitless array of shapes.



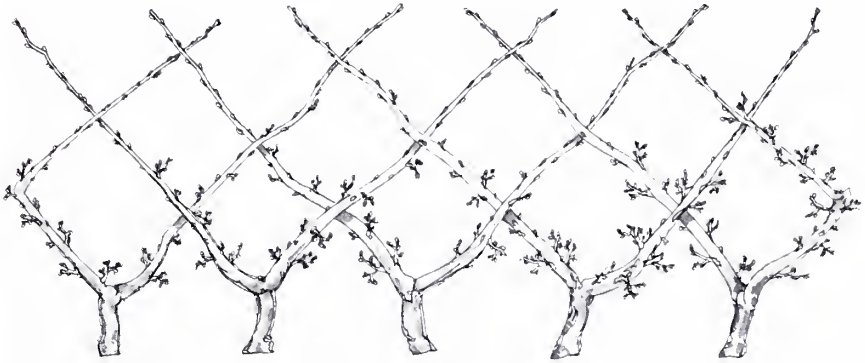
Horizontal Espalier



Double U

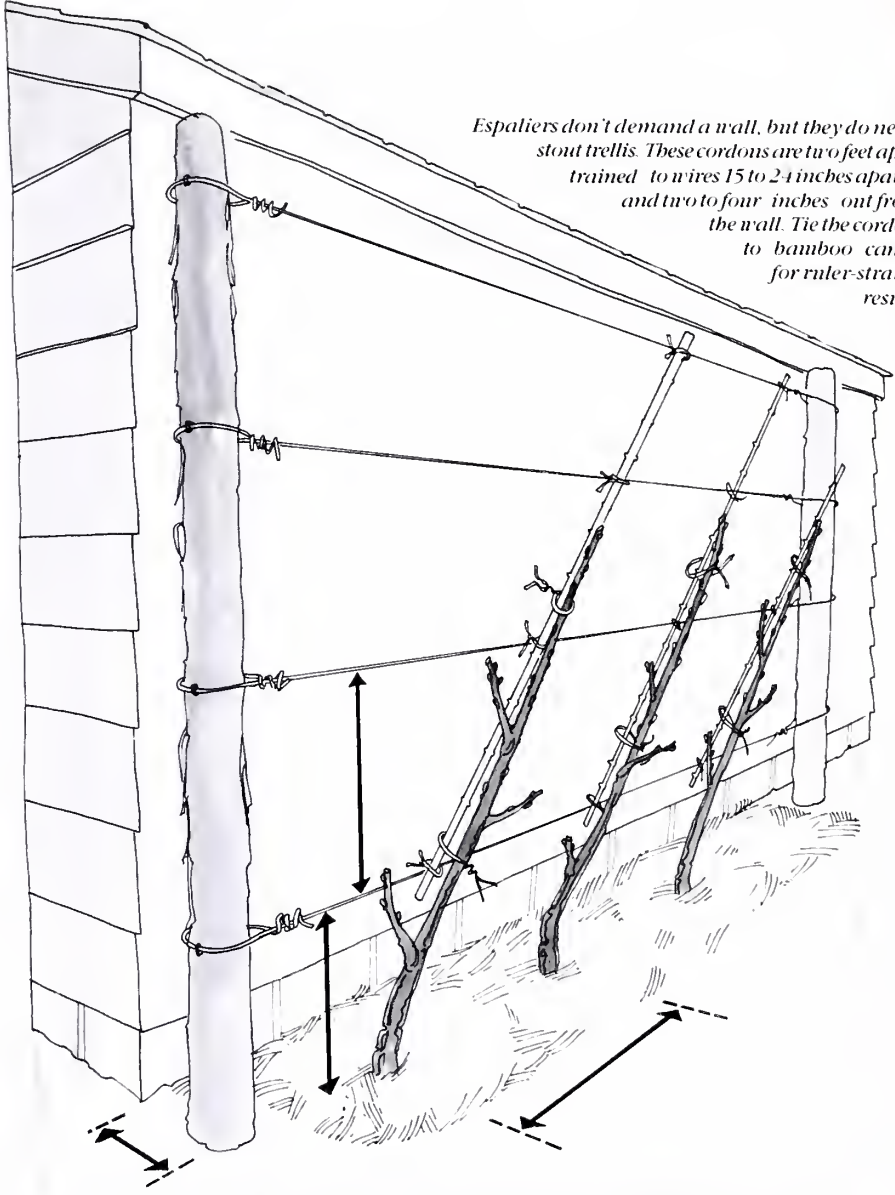


Arcure, done with weights. Eventually graft limbs together.



Belgian fence is a favorite for garden enclosures and screens.

Illustrations by Frank Frez



Espaliers don't demand a wall, but they do need a stout trellis. These cordons are two feet apart trained to wires 15 to 24 inches apart and two to four inches out from the wall. Tie the cordons to bamboo canes for ruler-straight results.

just one) trained with multiple arms. Where ground space is limited, the multiple-armed espalier is perfect. But if you have more planting room, single cordons let you plant more trees, which ensures better pollination and offers a longer harvest season and a wider variety of fruit.

Fruiting spurs have a strong tendency to grow toward the source of light, just as leaves do. Espaliers grown on trellises in the open will be most balanced when the row runs north to south. When the row runs east to west, virtually all the fruit spurs will form on the south side. Note: If you put an espalier on a southward property line, the spurs will form on the neighbor's side! Wall-trained trees, of course, will always form spurs on the outward side, where you want them and where reflected light can boost fruit production and quality. North walls, however, are too shady for sweet tree fruit.

All of the well-maintained espaliers I saw in England were on some sort of wire trellis. When grown against a wall, the branches were fastened to a system of wires attached two to four inches out from the wall's surface. In the trees' formative years, growers lash bamboo

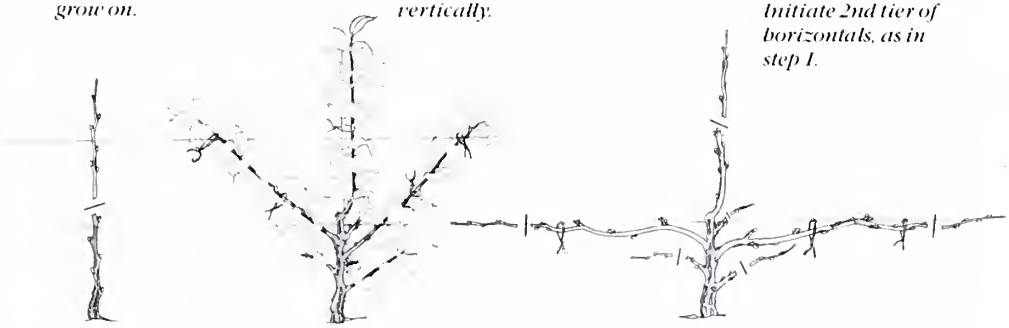
canes to the wires and train the tips of the fruit branches to the canes. This encourages growth that is ruler-straight and precisely spaced. And to my taste the quality of the result makes the bit of extra trouble and the expense of using bamboo definitely worthwhile. Use heavy wire—12 to 14 gauge. Space the wires on the trellis horizontally, 15 to 24 inches apart, with the first wire about 15 inches above ground level. On fences or walls, the highest wire should be at least six inches below the top of the structure for the sake of good looks.

Training Horizontal Espalier

1. Cut above the first wire, and let three of the buds that sprout grow on.

2. Tie on training canes. Train the arms at 45° and the leader vertically.

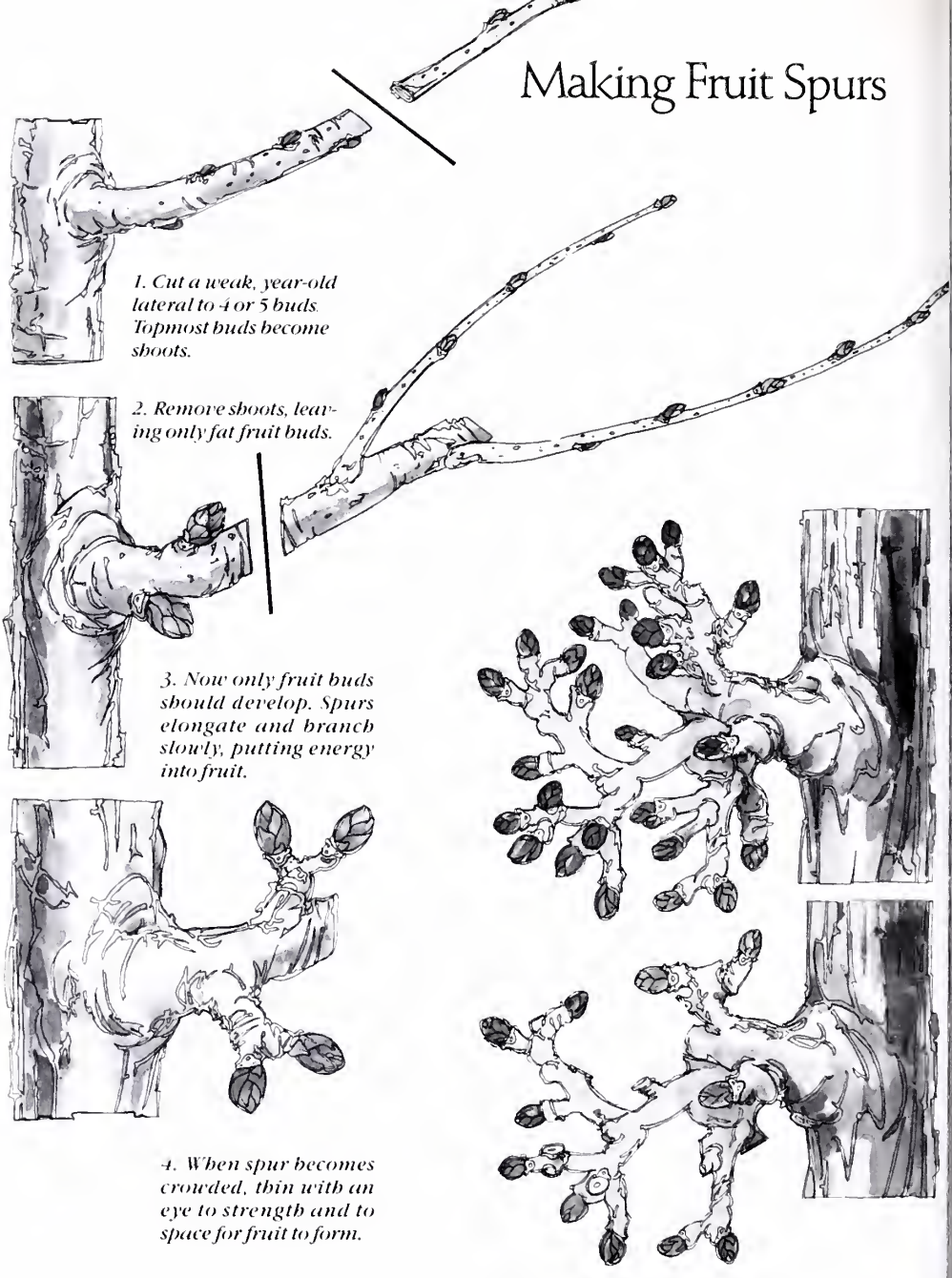
3. As the arms reach desired length lower them, slowing growth. Initiate 2nd tier of horizontals, as in step 1.



4. Encourage fruiting spurs on first tier and on trunk. Train 2nd tier as in step 2.

5. Lower 2nd tier of horizontals and continue until allotted space is filled. To make U's, let tips grow upwards.

Making Fruit Spurs



1. Cut a weak, year-old lateral to 4 or 5 buds. Topmost buds become shoots.

2. Remove shoots, leaving only fat fruit buds.

3. Now only fruit buds should develop. Spurs elongate and branch slowly, putting energy into fruit.

4. When spur becomes crowded, thin with an eye to strength and to space for fruit to form.

Tree Work

As you choose trees for the espalier, pay as much attention to the rootstock as to the variety on top. Successful espaliers require the most restrictive rootstocks to help contain growth. For apples, buy trees on M9 or M26 rootstocks. If the soil is heavy or sandy, try the more vigorous MM106. Choose pears that are grafted on either Quince A or Quince C rootstocks. Don't settle for trees labeled simply "dwarf." If the rootstock is not made clear on the label or in the catalog, ask the nursery to explain what rootstocks they are selling. When starting an espalier, you want a young tree, just one or two years after the graft was made, not one that has already produced a lot of side branches.

Plan the cordons or bearing arms to be about two feet apart. If you are planting single cordons, that will mean one tree every two feet. Fasten the bamboo framework for the espalier to the wire trellis before planting. Oblique cordons should angle to the north or away from the most intense light source, to enhance dwarfing.

Espaliered fruit trees are not made by creative pruning. Pruning generally produces exactly the opposite of what you want from the tree, encouraging vigorous, juvenile growth when you want growth that is mature and fruitful.

Instead, think of your first goal as growing the tree to fill the shape you've outlined with the bamboo or other cane you are using, and don't let the tree fruit until after the basic structure for the espalier is grown. A six- or seven-foot-tall espalier will reach full height two to four seasons after planting, depending on the stock you start with and whether you are growing a single-cordon or a multiple-armed espalier. If the tree flowers early—and dwarfing rootstocks do encourage that—pinch out all the tiny fruit right after petal fall. After the tree has covered the allotted space, the goals are to fill out the cordons with fruiting spurs and to keep the tree in bounds.

If a side branch forms on a cordon and you cut it back in winter or spring, it will respond by sending out another vigorous shoot, and maybe two or three. The side branch is a potential fruiting spur, so control its growth not by cutting but by bending or weighting it into a horizontal position. That will slow it down without sending the hormonal signal to make more shoots. Do it early enough in the season, within the first month or so of growth, and fruit buds will form along the horizontal branch. Since fruit buds make blossoms rather than vegetative growth, you can safely cut the side shoot back to a fruit bud after the plant is dormant.

During the formative stages, the only reason to cut the plant back hard is to create several strong shoots instead of one. Then gradually bend the new shoots in the desired direction. To make a U, for example, cut the tree to a bud just above the wire that will support the bottom of the U. That will encourage two or three shoots to form. Take the two best candidates and tie them to canes at 45° angles from the vertical wire. Use a stout twine, but one that will rot before cutting into the expanding limb. Bend any extra shoots toward the horizontal so they eventually become fruiting spurs as described above, or send them in another direction if that is necessary to complete the shape you are working toward. As the seasons progress, bend the 45° branches to canes along the horizontal wire and let the tips turn vertical when they have reached the width of your desired U-shape.

Finishing Touches

Another way to control side shoots—to discourage vegetative growth and create fruiting spurs—is by summer pruning. Late in the season, when growth has naturally slowed, cut back the more vigorous side shoots to leave just three leaves beyond where growth began in spring. Ignore the rosette of tiny leaves that forms where the vegetative bud first opened; the ones you want are three full-size leaves. Prune shoots that are at least nine inches long and whose bark is starting to turn from green to brown at the base. When you see such branches, merely pinch them back. Under some growing conditions you may need to re-prune some of the shorter branches a month or so after you first pass through the trees. Shoots shorter than nine inches when autumn arrives usually end in a fruit bud, so leave these alone.

If a cordon has bare stretches, notching will often induce a dormant bud to awaken and develop into a fruiting spur. As soon as possible after the tree leafs out, make a shallow notch 1/8 inch wide and 1/16 inch deep just above the dormant bud where you want a fruit spur. The break in the bark will cause sap to back up in the vicinity of the bud and it will begin to develop. It should blossom the next spring.

When the espalier reaches the top wire, end it by creating a fruit bud there. As the tree matures, the uppermost spurs will tend to grow more vigorously than the lower ones. The shading they create further depresses the growth of the lower spurs. As spurs get crowded and shade their neighbors, thin them out a little each year to maintain balance.

In general, you should see abundant blossoming, relatively little aggressive vertical growth, and ample light shining through to color up most of the fruit. Allow each flower cluster to produce only one fruit. A well-grown seven-foot cordon will yield six to eight pounds of fruit each year. ✡

Vines for Every Purpose

They cover a multitude of sins

Tovah Martin

AS THE YEARS march on, and the old homestead grows older, we postpone repairs by adding vines. Hops screen the failing front of an abandoned slate-roofed workshop, while akebia camouflages a lightning-damaged apple tree. Somehow, taking up a shovel for planting a vine is always more palatable than brandishing hammers, boards, and chainsaws.

Vines are Mother Nature's favorite method of recycling. As the years progress, the apple tree is transformed from a dying stump into a pillar of living, growing foliage. And although the old shop's working days are long gone, it still looks quaint, thanks to a concealing screen of hops. The farmstead retains its character, as well as its dignity.

We tend to use climbing plants as camouflage, but vines are effective for many purposes other than saving face. Most vines have a friendly, homey appearance. A fence looks less obtrusive if it is wrapped in a bower of greenery and blossoms. A wall is less foreboding if a vine is scaling it. Even a mailbox is more inviting with morning-glories scrambling up the post. Vines soften lines and link areas, obliterating the boundaries between human domain and nature's territory.

A little planting goes a long way with vines. Before planting a vine, find out if it is suitable to fill the position you intend it to have. Can it climb your high fence? On the other hand, some vines are overqualified for certain jobs, a good example being that infamous immigrant, kudzu, which outgrows everything and is all enveloping.

A vine's support system is equally crucial to its ultimate happiness. If you place a tendril climber against a wall where it has nothing to wind around, it will go nowhere. But if you provide that vine with a foothold, it will gleefully scamper up.

Roses grow luxuriously on a wall creating a green tapestry. Prune to keep in bounds.

Vines are usually divided into two categories. Blooming vines feature an eyeful of color in addition to seasonal foliage, and nonblooming vines cover quickly and thickly with ornamental leaves but have no flowers. Many foliage vines retain their leaves throughout the winter.

Temporary Help

Occasionally situations arise when you could use a vine's assistance, but you hesitate to commit yourself to a long-term relationship. Perhaps you need an impromptu screen, or you want to experiment with different vines before deciding on a permanent planting. An annual vine might provide a perfect space holder, and a successful planting often becomes a yearly tradition.

Flying cucumbers. It is amazing what some vines can achieve in a single season. Take flying cucumbers (alias wild cucumbers) for example. They can easily ascend to the top of a two-story building in one year, and a single plant can span a broad area as it climbs. Flying cucumbers (*Echinocystis lobata*) are native to this country, and they might well rank as weeds in some people's book. To their credit, they are quick, easy, and handsome vines with soft, pointed leaves accented by an abundance of lacy white flowers intermingled with frilly tendrils which hoist the lightweight vine on its upward journey.

Flying cucumbers are rarely planted by design. Instead they seem to volunteer themselves for any job in which a nimble-footed climber might test its prowess. Once they gain a foothold, they can scale a wall practically overnight. The foliage is enticing to nibbling insects, but their appetite cannot possibly keep pace with the plant's growth. Generally only the old, bottom leaves are damaged.

Tovah Martin of Logee's Greenhouse, Danielson, CT is a freelance writer and photographer. Her book, Victorian Parlor Gardens *will be published by Timber Press in 1988.*

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I have never seen flying cucumbers listed in seed catalogues, but the vines are easily transplantable from wild seedlings. One note of caution, however: the spiny fruits send their seeds flying hither and yon. Once you have planted a flying cucumber, you will probably have to contend with a yearly crop of the vine.

Morning-glories. For a more conventional and premeditated display, you might try morning-glories. Their abundant trumpet-shaped flowers and heart-shaped leaves are traditionally found throughout the countryside, skirting old farm sheds and enshrouding rural mailboxes. Several different morning-glory hybrids are on the market, but the best known is *Ipomoea tricolor* 'Heavenly Blue.' Unfortunately 'Heavenly Blue' is also the least hardy hybrid; its seeds rarely survive Northeastern winters. That trait can be an advantage, however, if you do not want to renew acquaintance with your morning-glory next season. If you prefer a hardier hybrid, try the pink-flowering 'Scarlet O'Hara.' It usually reseeds every year while also showing more vigor during the summer.

Kenilworth ivy. In Britain, Kenilworth ivy (*Cymbalaria muralis*) is a traditional wall cover. Instead of climbing up, it dangles down, sending its small, ivy-shaped leaves cascading limply from crevices in the wall. Although the foliage is deceptively ivylike, Kenilworth ivy is actually a member of the snapdragon family, and its flowers are pint-sized renditions of their more conventional flower-garden kin. The tiny, pale-lilac and yellow blossoms are profuse, and they set seed readily. The ripe seed head has the unique and entertaining ability to turn around and deposit its issue into the crevices of the wall. Kenilworth ivy can grow in sun or shade, but a bright location will produce more of those adorable little flowers.

Hardy Flowering Vines

Clematis. As part of our cover-up campaign, we planted clematis on the north side of the gristmill, a structurally sound building in need of a new coat of paint. Unfortunately, the clematis never thrived.

The clematis's failure to screen the gristmill did not dampen my affection for the vine, it only rendered that elusive plant more appealing. And so, when we built a new lath house, I put clematis into the raised beds. They are thriving, and

Euonymus fortunei *is an evergreen vine with glossy, dark green leaves. It is valued for its ability to cling to brick, stone and stucco.*

the spanking new lath house looks more at home on the old property with a modest screen of vines in front.

Clematis may be among the most beautiful flowering vines suitable to our climate, but it is not the easiest plant to grow. It prefers an alkaline soil and an east or western exposure. The roots must be kept cool, however. The lath house allows sun to hit the foliage, but it shades the base from the hot noon rays.

Most hybrid clematis are ambitious climbers, hoisting themselves by their leaves, which double as holdfasts, twining around supports. They will require a sturdy wire or trellis (we use whitewashed snow fencing) on which to lean and can easily clamber up 10 feet in a single year. Most gardeners prune back clematis in late fall or early spring to clear out dead debris. Be cautious when pruning, however, for some clematis produce blossoms only on old wood. A spring pruning could cost you a year's flowers.

And what good is a clematis without its huge, star-shaped blossoms? With a little advanced planning, you can time your early, midseason, and late-blooming clematis to keep you well supplied with flowers all spring and summer.

Clematis comes in a broad range of colors including white, blues, pinks, purples, and red, with petal spans that can reach six to eight inches. Clematis hybrids may not be easy to please, but they reward your efforts with an unequaled performance.

Although the large-flowered clematis have definitely stolen the show from the smaller-blooming species, *Clematis paniculata* is a strong contender in the competition for floral magnificence. *C. paniculata,* a species from Japan, produces a cloud of small, pure-white, intensely fragrant flowers that completely engulf the plant in late September. They add a nice accent to surrounding autumn color as well as effectively camouflaging fences, or clambering over trellises and arbors. Nor does the display end there. After blooming, the spent blossoms remain as a thick, silver mass of fluffy, downy seedpods. They can be cut and fashioned into an unusual wreath which remains intact for years.

Clematis *planted in a raised bed climbs the adjacent lath house. These vines are among the most beautiful flowering vines for the northeast.*

C. paniculata requires full sun and rich soil. It is easier to grow than the hybrids, and when content, it becomes a puffy tangle of vining foliage that requires a yearly thinning to give the next season's growth a clean start.

Climbing hydrangea. When you mention hydrangeas, visions of round bushes bearing balls of marine-blue flowers immediately dance through your head. But a lesser-known vining member of the family can be grown as an effective cover-up for fences, walls, or wherever it can lean its heavy, blossom-bedecked branches. *Hydrangea anomala petiolaris* (formerly *H. scandens*) has shiny, rounded foliage covered by lacy umbels of sterile, creamy yellow, petalless flowers surrounded by a contingent of large, white-petaled, fertile blooms. It is a curious and handsome combination, especially when displayed against a background of forest-green foliage.

The climbing hydrangea is a robust, hardy, and fleet-footed vine that can climb to 60 feet rapidly. It is occasionally reluctant at first, but once established it takes off, forming a mass of thick foliage and spring flowers. The vine adheres to its support by rootlets which can cause damage to concrete or wooden surfaces. Plant your climbing hydrangea in an east, west, or bright northern exposure.

Climbing roses. It would be difficult to imagine our rural routes defrocked of their engulfing wild roses, which ramble everywhere and cloak the scenery with early-summer color. Wild roses hardly need encouragement. You can use their rambunctiousness to your best advantage, however, if you are prepared to undertake some ambitious pruning, a chore that is best performed in early spring when the buds first appear. You can prune wild roses ruthlessly. We let our goats do the honors, and even their incessant nibbling cannot thwart a wild rose's growth.

Roses like to lean on their supports, and so they are suitable for porches, gazebos, fences, latticework gateways, and low walls. Where security is a consideration, thorny roses can function as a discreet barricade. Although cultivated climbing roses are equally popular as garden screens, wild roses are better suited to informal patch-ups such as we perform around our rural farmhouse.

Roses prefer full sun, but not in combination with roasting midsummer temperatures. Where

the mercury pushes the thermometer's limits, they should receive partial shade. They grow best in a lightly acid soil, which poses no problem in most Northeastern areas. Unfortunately all roses are susceptible to Japanese beetles, but the wild varieties are sufficiently vigorous to endure any insect infestation without the aid of insecticides.

Wisteria. If you enjoy drama, try wisteria. A wisteria in full regalia can become the talk of the town. Your neighbors will arrive with cameras to document the appearance of that exotic-looking Oriental vine weeping its long, sea-blue chains of fragrant, pealike flowers. You will be become a local celebrity.

Unfortunately it's not always quite that easy. Wisterias are erratic and notoriously unreliable bloomers, and the vine without flowers is not a particularly handsome sight. Wisterias have been known to stubbornly refuse to blossom for decades, despite every effort to win their good graces. If you have been blessed with a blooming vine, however, your yard is destined to become a local attraction.

In this country we grow two popular species: *Wisteria sinensis* (Chinese wisteria) and *W. floribunda* (Japanese wisteria). Both are considered to be hardy to Zone 5, although the Japanese wisteria is a more reliable bloomer in cold climates. Occasionally, however, a cold winter will kill flower buds, which can be a heart-rending experience, considering that it often takes the vine many years to settle down to the serious business of blooming.

Wisterias prefer a sandy, well-drained, weak soil and full sun. Frequently their failure to bloom can be traced to a rich diet of too much nitrogen. If decreasing the fertilizer underfoot does not procure bud set, try root-pruning the specimen to discourage foliar growth and encourage flowers.

Wisterias climb to 40 feet quickly, and they reach that height by twining their thick stems around a strong support which can bear the vine's substantial weight. If that support hap-

Parthenocissus tricuspidata, *Boston ivy, is widely used to cover walls and buildings. Its three-lobed leaves turn red in the autumn.* Hedera helix *covers wall on the other side of the gate.*

pens to be a living tree or bush, the wisteria can easily strangle its host. Traditionally, wisterias are found on gazebos, porches, or doorways.

Trumpet vine. I first met *Campsis radicans,* the trumpet vine, at an Arizona nursery, and, thinking that I had discovered a novelty, I brought it home to New England. I was sure that the big, blazing-red, trumpetlike flowers would wake up the neighborhood and put a little pizzazz in the old homestead. I planted the vine and waited for the neighbors to come around. They came, but they never made mention of my campsis. Much later I discovered the reason for their lack of interest. A venerable six-foot-wide trumpet vine has resided at a local post office for a generation or two. It's hard to keep abreast of these New England gardeners.

The trumpet vine requires the sturdy support of a stake or trellis. Its branches develop thin rootlets, but they are too weak and easily severed to support the weightly vine, especially in windy locations. You can assist Mother Nature and prevent imminent disaster by tying the branches with twist-ties.

Silver fleece vine. If you need something obliterated quickly and completely, this is the vine for you. If not, the silver fleece vine can be more than you bargained for. Its rambunctiousness borders on the ridiculous, and its rapid growth can become a nuisance.

To its credit, the silver fleece vine (*Polygonum aubertii*) is extraordinarily hardy, very drought resistant, virtually pest free, and covered with airy clouds of wispy white flowers in abundance throughout the summer.

Hops. Although the hop vine won its fame for its assistance in the brewing process, there is no reason why that hardy, stalwart vine should not do double duty as an ornamental. We find the hop vine (*Humulus lupulus*) to be a quick, efficient cover-up. Give it a few wires and a sunny or partially shaded location, and off it goes.

Fruit-bearing Vines

Undoubtedly the most famous vine to ever scramble up a trellis is the grape, known since Biblical times simply as The Vine. Grape growing is a science unto itself, and I doubt that my experiences in our tiny two-vine vineyard qualify me as an authority on the topic. Therefore I will leave the subject of grape culture to an expert and simply suggest that you choose a very hardy variety and plant it in a sunny, fertile, well-drained location.

Optimists should provide their grapes with a strong wooden arbor fitted with laths from which the ripening fruit can dangle. Grapes are prone to a hoard of insects and diseases, and they suffer from the ravages of pilfering birds. Do not begin designing labels for your wines until you have enjoyed a successful grape harvest or two.

Foliage Vines

Ivy. Vines are generally used as cover-ups, and that being the case, we can only suspect that the vaunted Ivy League schools might have something to hide. Could the stonework be failing?

English ivy ranks very high on the roster of popular vines, a distinction that was established in colonial times. Although ivy claims no flowers, its handsome, glossy green leaves give a formal, well-groomed, and somewhat imposing impression. Ivy is delightfully amenable: it can grow on a north-facing wall just as easily as it can cover a south-facing facade.

Most English ivy is reliably hardy to Zone 5, although certain cultivars can stretch that limitation slightly. Ivy is also very easy to obtain. A snip is usually free for the taking, if you ask first. Bear in mind, however, that when you plant ivy, you are making a friend for life, if not also for the lives of many generations to come. Plan and plant carefully, and remember that ivy adheres to walls with a tenacious grip than can do damage to wood or concrete surfaces.

Boston ivy and Virginia creeper. These two species of the genus *Parthenocissus (P. quinquefolia,* Virgina creeper, and *P. tricuspidata,* Boston ivy) are both ivy look-alikes. In fact from a distance you might easily mistake Boston ivy for the real thing. Both vines are often called upon to perform similar services. In fact, Boston ivy is occasionally invited to deck out the halls of the northerly Ivy League schools.

Of the two *Parthenocissus,* Virginia creeper is the hardiest. It is native to the eastern United States and is hardy to Zone 3. Being a wild species in this area, however, Virginia creeper has the potential of becoming a nuisance rather than a help. When kept under control, Virginia creeper is quite handsome. Its five-fingered leaves are large and enduring. Even hailstones do not mar the slit leaves. Virginia creeper does have one foe. Japanese beetles can cause it considerable damage.

Despite the rumors, Boston ivy does not hail from Beacon Hill. It is native to China and Japan, although it has become very comfortable in our climate. Boston ivy climbs quickly to 60 feet and forms a thick mass of shiny, ivylike leaves. It is reliably hardy to Zone 4, but it can usually survive colder climates. Both Virgina creeper and Boston ivy provide the additional bonus of an extravagant autumnal display of striking orange foliage.

Akebia. We stopped mourning our old apple tree when the akebia took it over. Now it is a

Sources

Seeds of *Humulus lupulus* and *Cymbalaria muralis:*
Thompson & Morgan
P.O. Box 1308
Jackson, New Jersey 08527
free catalogue

Plants of *Humulus lupulus:*
Logee's Greenhouses
55 North St.
Danielson, CT 06239
catalogue—$3.00

All Other Vines:
White Flower Farm
Litchfield, CT 06759-0050
catalogue—$5.00

Carroll Gardens
444 East Main Street
P.O. Box 310
Westminster, MD 21157
catalogue—$2.00

Milaeger's Gardens
4838 Douglas Avenue
Racine, WI 53402-2498
catalogue—$1.00

Spring Hill
110 West Elm Street
Tipp City, Ohio 45371
free catalogue

Van Bourgondien
245 Farmingdale Road
P.O. Box A
Babylon, New York 11702
free catalogue

Wayside Gardens
Hodges, South Carolina 29695
free catalogue

Parthenocissus cuspidata and *Hedera helix* climb the walls of a house creating a leafy canopy over the doorway. *Hedera helix* is an evergreen vine.

Vines At A Glance

COMMON NAME	BOTANICAL NAME	BLOOMING TIME	FLOWER COLOR	HARDINESS ZONE	POTENTIAL HEIGHT	TYPE OF CLIMBER	COMMENTS
Flying Cucumber	*Echinocystis lobata*	all summer	white	annual	20 ft	tendril	can become invasive
Kenilworth Ivy	*Cymbalaria muralis*	all summer	lilac & yellow	annual	dangles	dangles	should be grown on wall
Morning Glories	*Ipomoea* hybrids	July-Sept	blue or pink	annual	10 ft	twiner	susceptible to Japanese beetles
Clematis hybrids	*Clematis* hybrids	June-Sept	white, pinks, blues, purples & red	Zone 3	6 - 12 ft	wraps leaves	some hybrids should not be pruned
Autumn Clematis	*Clematis paniculata*	Sept	white	Zone 5	30 ft.	twines	fragrant flowers, easy
Climbing Roses	*Rosa* spp.	early summer	pinks & white	Zone 3	30 ft.	leaner	can become invasive
Climbing Hydrangea	*Hydrangea anomala petiolaris*	June	white & creamy yellow	Zone 4	75 ft.	rootlike holdfasts	can damage wood or concrete surfaces
Chinese Wisteria	*Wisteria sinensis*	mid-May	blue	Zone 5	40 ft	twiner	can strangle living supports
Japanese Wisteria	*Wisteria floribunda*	late May	blue	Zone 4	40 ft.	twiner	difficult to bloom
Trumpet Vine	*Campsis radicans*	July-Sept	red	Zone 4	30 ft.	weak rootlets	a yellow variety is also available
Silver Fleece Vine	*Polygonum aubertii*	June-Sept.	white	Zone 4	20 ft	leaner	can become invasive
Hops Vine	*Humulus lupulus*	Aug.-Sept.	green	Zone 3	25 ft.	twiner	susceptible to aphids
Grape	*Vitis* spp.	grown for fruit		Zone 2-6	10 ft.	twiner	prone to insect damage
Akebia	*Akebia quinata*	mid-May	purple (insignificant)	Zone 4	30-40 ft.	twiner	can become invasive, has evergreen foliage.
English Ivy	*Hedera helix*			Zone 5	60 ft	root grasps	roots can damage concrete or wood Evergreen foliage.
Boston Ivy	*Parthenocissus tricuspidata*			Zone 4	60 ft	root grasps	foliage turns orange in autumn and drops
Virginia Creeper	*Parthenocissus quinquefolia*			Zone 3	60 ft	root grasps	can cause damage to wood or concrete surfaces

mass of greenery both summer and winter, completely enshrouded in long streamers of lacy, five-fingered foliage. Akebia is a fast-growing native of Japan that can climb to 35 feet and then race back down to the ground just as quickly. It continues its frantic dashing up and down until it has engulfed everything with chains of leaves.

Thank heaven for vines. I shudder to imagine a world without them. They cover a multitude of sins. Lacking vines, wire fences would be exposed, concrete slabs would go naked, and our quaint workshop would have to be demolished. Our family of gardeners would have to learn carpentry skills. With the aid of a few carefully positioned vines, our old homestead presents a bright, smiling facade, while the chainsaw sits idle in the cellar.

An Autumn Garden

Peter Loewer

Cynara cardunculus, *cardoon, has thistlelike blossoms which appear on four-foot stems that stand high above beautiful, deeply cut, arched leaves of dull silver.*

All drawings by Peter Loewer

Autumn in the Catskill Mountains is usually over just after Halloween. Until then, most of the flame-colored leaves manage to cling to the trees. In local gardens, a few staunch marigolds continue to bloom, while bedding mums dot driveway borders with brilliant tones of red and orange. Then, in early November, the cold fall rains come; wind-whipped drops fly across dark gray skies, pelting the trees, and soon only the beeches, the oaks, the now-yellowing larches, and an occasional peach have any foliage at all. Shortly after Election Day, night temperatures go down to 20 °F. By Thanksgiving, sleet storms may alternate with light snow.

It is now early November in the Catskills. One night out of three, temperatures in the garden fall to 26 °F, and it's 10 o'clock in the morning before the frost on the north side of the roof melts and turns to wisps of steam under a still, warm sun. Only when the stars are hidden by clouds brought up from the South by spiraling high-pressure systems will the garden awake the next morning without any ice in the birdbath or a few frozen drops at the tip of the outdoor water faucet.

There's a cool breeze rustling the leaves of the ornamental grasses in the perennial border as I pass on the way to the cutting garden to see what still offers color. A flock of red-winged blackbirds flies overhead (the geese have long gone) on its way to Jamaica Bay and then south.

Peter Loewer is a botanical artist and scientific illustrator who writes and illustrates his own books. He was guest editor of the Plants & Gardens *handbook "Garden Ornaments."*

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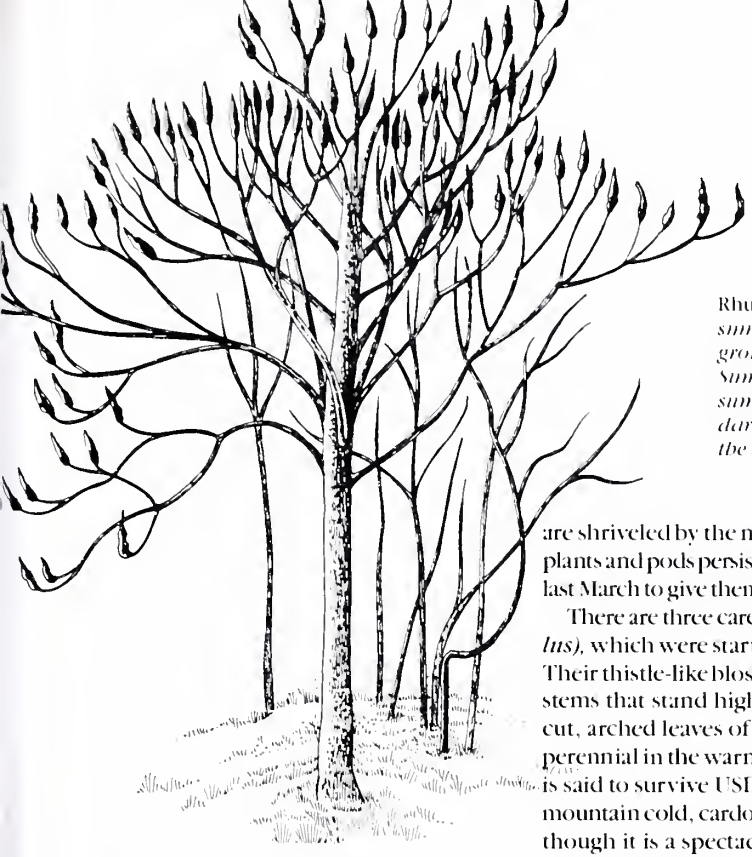


Rhus typhina, *staghorn sumac, will form a small grove if carefully managed. Sumac provides shade in summer, color in autumn and dark red fruit clusters through the winter.*

A number of plants still have their autumn dress. Japanese iris are swords of yellow-brown, and a few hostas display yellow leaves, though most are now beginning to break apart. Many of the smaller ornamental grasses have put forth new leaves in answer to the cold. But generally, those plants that were specifically chosen to provide color or flowers from spring through fall give the best show.

In the cutting garden, a number of the annual California tidy-tips *(Layia platyglossa)* are still in bloom; their white-edged yellow petals seem impervious to the cold. Seeds are scattered on the spot two or three times a year to ensure continual bloom.

Arching five feet over the heads of the tidy-tips are the branches of milkweed or butterfly flower *(Asclepias fruticosa),* a perennial from Africa that is treated as a warm-season annual by most seed catalogues. A fine ornamental, this rangy plant is usually grown for the strange pods that follow the blossoms. Bronzy-green in color, the pods are covered with soft spines and often grow to one and one-half inches in diameter. White bunches of small, rather unusual flowers that hang in groups of five or six are shriveled by the middle of October, but the plants and pods persist. We started them indoors last March to give them a big jump on the season.

There are three cardoons *(Cynara cardunculus),* which were started indoors in early April. Their thistle-like blossoms appear on four-foot stems that stand high above beautiful, deeply cut, arched leaves of dull silver. This plant is a perennial in the warmer areas of the world and is said to survive USDA Zone 7 winters. In our mountain cold, cardoon is treated as an annual, though it is a spectacular one that will persist well into November.

Just to the right of the cardoons are the three-foot-high stems of the Australian native, winged everlasting *(Ammobium alatum).* The common name is in homage to the strange green ridges that run up and down the stiff, winged stems. In fact, the plants resemble tall, green "twist-ems" (the kind used to tie up plastic bags), each topped with small, white everlasting flowers with yellow centers. This is another plant that one would think would shrivel up at the first sign of frost, yet the only hint of the cold is the diminished size of the flowers; what was once three inches wide is now only a scant inch. The seeds were started indoors last spring, and the seedlings were transplanted on the first of June; the plants began to bloom in July.

Finally, a whole row of ornamental cabbages *(Brassica oleracea)* stretches across the front edge of the vegetable garden. In my area, the plants are true biennials and are grown only for their foliage; flowers only appear the second year and are immediately killed by the frost. Leaves are either deeply cut or slightly lobed. The center leaves of the plant are predominantly pink, white, red, or purple, depending on the cultivar. Seed is sown either indoors six weeks

Colchicum *'Waterlily,'autumn crocus, has glorious double flowers of mauve which appear above the brown crumpled leaves of autumn. It blooms in mid-October.*

before the last spring frost, or directly in the garden in late spring. As the nights begin to get colder, the leaves of ornamental cabbage become brighter with color; the colder the nights, the brighter the tints. (For a most unusual centerpiece for an autumn table, the stalks can be cut, the larger and rangier leaves at the bottom removed, and the cabbage placed in a vase of water, where the plant will continue to grow.)

All the perennials that brighten the autumn garden were chosen because they meet three requirements: they are hardy in an area where once every three or four years the temperature plummets to -25 °F; they require little care; and they are at their best when the days shorten, in September and October. Rather than bunching these particular plants together in one spot, we have scattered them throughout the garden.

To the left of the vegetable garden, I've started a grove of staghorn sumacs *(Rhus typhina)*, patterned after those growing in the Wild Garden of Wave Hill in the Bronx, New York. My first sumac was a chance seedling from the woods at the top of the hill; after five years, it is now a sizable tree. By selectively cutting the shoots produced during the spring and summer, I can carefully plan the direction of the grove.

Americans often denigrate the sumac because it grows in poor soil and is common throughout the Northeast. But the English have long recognized the sumac's value; the Royal Horticultural Society gave it its Award of Garden Merit in 1969. I, too, find it to be a valuable tree. All summer long, the tropical-looking branches give welcome shade, while in the fall, the tree is a blaze of orange. Now, toward the end of autumn, the leaves have all but fallen, yet the stems are still topped with the dark red clusters of fruit at the branch tips.

On the bank that rises above the perennial border, we've planted the rock cotoneaster *(Cotoneaster horizontalis)* so that its branches will cascade down the slope. Attractive all through the year, this creeping bush is especially distinctive in the fall, when the red berries sparkle among the glossy, green leaves. The flowers in June are small and pink and easily missed, but the berries are truly beautiful and persist throughout the winter. A young plant will grow only inches off the ground but will eventually develop a herringbone pattern of layered branches with shiny, deep green leaves.

In various places around the garden, we've set out autumn crocuses. The glorious mauve-tinted double flowers appear in stark contrast to the brown crumpled leaves blown about by the winds. The loveliest is *Colchicum* 'Waterlily', which was planted on September 15th and began to bloom in mid-October. The soil must be well drained, and since the six-inch leaves do not appear until the following spring, the corms must be placed carefully.

On top of the bank, winged euonymus *(Euonymus alata)* stands guard against the fields that follow up the hill. The leaves are sparse and bright scarlet against the blue sky. On closer inspection, one can see bright orange berries standing out against the strange cork-winged stems of this six-foot-tall shrub. Winged euonymus is another garden denizen that entertains the whole year, with fresh green stems in spring and summer; bright red leaves and berries in the fall; and finally, unusual branches and twigs that give a fine texture to the winter garden. Soil demands are simple, and full sun is preferred.

Along the back wall of the garage, I put in a two-foot-high raised bed, surrounded by a wall of stone rather than of wood. The bed is filled with soil laced with white pine needles, sand, and gravel that was left over after the driveway was scraped and topped with new gravel. The bed faces southwest and sits in the direct sun in the summer. There I planted a clump of *Stachys byzantina* (lamb's-tongue or lamb's-ears, depending on your point of view). The plants now cover an area of four square feet and form

an eight-inch-high mass of soft, felty, gray leaves. At this time of year, the mass of leaves is topped with many dead, but still-attractive 30-inch stems that carried small purple flowers throughout July and August. What a happy sight to see these woolly leaves, warm-looking even under a layer of frost!

Just behind the lamb's-ears are three boltonias *(Boltonia asteroides),* from a genus of asters named after an English botanist, James Bolton. Often called the thousand-flowered aster, boltonia will grow under most conditions, though it requires adequate sun. The flowering stems of my plants are three to four feet tall and literally covered with starry blossoms. They have been brightening up this corner of the garden throughout most of October. 'Snowbank' is the attractive cultivar offered by most nurseries in the United States. Boltonias are especially beautiful in a wild garden.

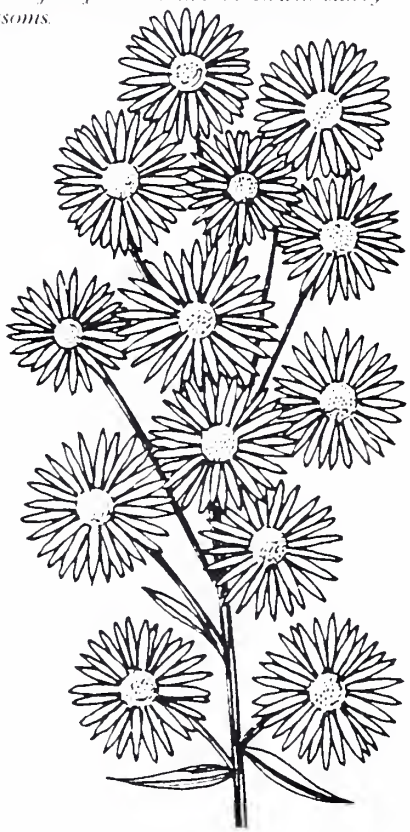
Below and along the edge of the raised bed where the stones face north and branches of a neighboring weeping birch provide some summer shade, I have planted a line of *Lamium maculatum* 'Beacon Silver'. Only the edges of the leaves are green; the rest of the surface is a soft silver that glistens in the shade, a fit background for the little pink, snapdragon-like flowers that bloom during the summer. At this time of year, the leaves are still bright and silvery, and will remain so well into November.

Amur silver grass *(Miscanthus sacchariflorus)* can grow to a height of 12 feet in a good season. In our climate, it usually matures at around 10 feet, and is topped with waving, feathery plumes—first purple, then silver, and finally white. Throughout the summer, this clump of bamboo-type stems and gracefully arched leaves is a focal point in the border, but the full beauty of this grass shines during the fall, when the flowers dry in the afternoon sun. After mid-October, the green leaves slowly change to light tan, and closer to the ground, the stems darken to red. The blossoms and most of the leaves will last into early spring. Full sun and average soil are the only requirements for healthy growth.

Next to the Amur silver grass is my favorite ornamental grass, variegated purple moor grass *(Molinia caerulea* 'Variegata'). This is truly a plant for all seasons: a fountain of fresh, green-and-white-striped leaves in spring; blossoms in summer on three-foot-high panicles that are striped like the leaves but also tinged with violet and green highlights; and then in the fall, a fireworks display of colors, best described as yellow-bronze, that persists well into winter, until the icy winds rip most of the foliage apart. Unlike most grasses, purple moor will tolerate partial shade. Since its ancestors are native to the moors of Scotland, it prefers an acid soil and even tolerates some dampness.

As I walk back to the kitchen for a late-morning cup of coffee, I pass the area across from the garage, a spot that is shaded all year by a 60-foot white pine that towers overhead. Around the trunk is a planting of myrtle *(Vinca minor)* that has been slowly spreading for 15 years. Summer or winter, it's a carpet of shiny green, dotted here and there with lavender flowers every spring. This morning I see three dots of color; the myrtle is blooming again, fooled by the mild afternoons into thinking it is already spring. ✲

Boltonia asteroides, *asters, brighten up the garden through most of October. The flowering stems are three-to-four feet tall and covered with starry blossoms.*



The Magic of Night Lighting

Robert Mabes

Most of us are familiar with outdoor spaces brightly lit for the purpose of safety, but have you ever been in a softly lit garden at night—a garden where aesthetics were as important as safety? There's real magic in those gardens. Outdoor lighting is, however, still uncommon enough that, in addition to being magical, it is also something of a mystery to most homeowners. In an effort to de-mystify the subject you'll find some of the necessary practical information on working with electricity in the box on page 48. What follows are aesthetic guidelines to consider before actually installing a lighting system in your garden.

Aesthetic Nightlighting A Primer

The goal of garden lighting is to produce a more livable outdoor area and to increase its beauty. By highlighting only the best aspects of your garden, you can create a nightscape that may be even more attractive than your daytime garden. The reason for this goes back to some time-honored principles of garden design—principles surprisingly easy to employ with the simple interplay of light and shadows.

Accentuate the Positive

The beauty of a particular garden feature—a fountain, a unique tree, or mass of blooming shrubs—is often hard for viewers to focus on, even in small gardens. The multiple "centers of

To re-create the magic of moonlight fixtures were installed high in these mature trees. Diffused by the foliage, the light has a natural quality. The light is not only attractive, but practical, illuminating the pathway for safe night-time passage.

Prior to retirement from the Kansas City Power and Light Co., Robert Mabes was a specialist on outdoor lighting, especially garden lighting. His own garden taught him much about the subject. He has designed garden lighting systems and staged demonstrations of outdoor lighting for many years in his area.

Reprinted with permission from Flower & Garden *magazine, April-May 1987.*

All photos by Michael McKinley

interest" common to most gardens—a clump of birches here, a large rhododendron in full bloom over there, and six hanging baskets filled with fuchsias right in front of your nose—all serve to distract from each other, and the scene as a whole may not have the strength or clarity to make it completely satisfying. To get around this problem, many of the world's truly great gardens take a very large outdoor area and break it down into smaller spaces or "rooms" with the use of tall, dense plantings—usually clipped evergreen hedges. These tall plantings effectively shield off surrounding garden areas or competing views. The garden designer is then in control of the area within the "walls," making it easier to accentuate the center of interest with color, texture, proportion, line, and scale. The results are often quite exhilarating.

The easiest, and fastest, way to achieve this effect in your own garden is to let the cover of darkness shut out what you don't want to see and then highlight the desirable features with nighttime lighting. By using darkness to define the space, it is fairly simple to direct light to create a center of interest from existing features in your garden. An object of interest can be man-made, such as a gazebo or a statue, or it could be an interesting tree or planted area. Even focusing on a part of a plant, such as a branch of a fruit tree, can be effective.

Highlighting a single object, such as this small statue, creates a dramatic focus in the night garden scene.

By using a three-wire grounded extension cord and a socket, you can see for yourself how effective light can be. Use a 30-watt, R-20 bulb contained within a folded piece of cardboard or other temporary shield. Aim the light up into shrubs and trees, or let the light skim the face of a fence. Once you see the hidden beauty in your garden, you will not rest until you paint your garden with light.

Begin your lighting plan by studying all the possible centers of interest in your garden. Look at each as if it alone was isolated from its surroundings. Your goal should be to create a mystery of highlights and shadows, not to flood the whole area with supermarket lighting. Depending on the objects featured, you might even create a theme for your night garden. For example, a non-Oriental garden by day might have a particular tree that suggests a Japanese mood. By choosing it as your center of interest, the whole garden will take on an Oriental look at night.

Once you have highlighted the center of interest, the second step is to "push out" the desired space with additional, perhaps softer, lighting to define secondary areas of interest. These secondary areas may be chosen for their forms, colors, or textures, but your aim is to create a feeling of depth, with the center of interest in the foreground and the secondary areas forming a background. This is where you will be able to work some magic in your night garden.

For more information on outdoor lighting, look for ORTHO Books' *How to Design & Install Outdoor Lighting*, available at most bookstores and do-it-yourself centers. Or write for a free booklet on do-it-yourself outdoor lighting from: TORO Home Improvement Division, Attn: Customer Service, Dept. FG, 5300 Shoreline Blvd., Mound, Minn. 55364.

Nine Tips to Guide Your Way

Keep the following nine tips in mind as you plan and install your nightscape.

Up-lighting.

Aim most of your light "up." This helps keep bright lights out of the viewer's and neighbor's eyes. When you are first starting out, keep in mind that a little light is a lot of light after dark.

Lighting a Large Tree

A 100-watt mercury vapor up-light is a most spectacular source of light. One light shining into a large tree produces a cool, quiet beauty, hard to describe. Its blue-green hue enhances the foliage, producing a delightful visual feeling.

Down-lighting

A tree with an interesting branch structure can be accented by hanging a down-light within it. Use a commercial unit or convert an old bird house by removing the floor and installing a small R-20 or R-30 watt reflector lamp within. It may confuse the birds, but it certainly disguises an otherwise unattractive fixture during daylight hours.

Decorative Garden Fixtures

It is not necessary to hide *all* the light sources within the garden. In fact, some outdoor lighting experts feel that if all the light sources are hidden, viewers will spend all their time trying to figure out where the light is coming from rather than enjoying the beauty of the scene. If

this is a concern for you, plan to have at least one light source in plain view. As a result, viewers will accept the total lighting without worrying about the source of the rest of the light.

A decorative lighting fixture will look out of place in the middle of a lawn. Lighting fixtures should be located among plantings, at the edge of lawn areas.

Refrain from using decorative lighting fixtures along the sides of driveways where they will be in the way of car doors and lawnmowers. It is far more effective to remove them from harm's way and light up the trees and shrubs immediately surrounding the driveway.

Security Lighting

Existing security lights placed high under eaves will compete with softer garden lighting. If you want both types of lighting on at the same time, say for a nighttime garden party, clip blue lenses over the security lights (available at large hardware stores) to bathe the surroundings in an atmosphere of bright moonlight.

Nighttime Hazards

Steps, walkways, and garden paths should be clearly identified for safety. Fifteen watt lamps, used in low fixtures, will be sufficient in most situations.

Post Lights

A light six feet up on a post is excellent for illuminating large areas, but most people use too bright a lamp in them. And because they are at eye level, they need shielding. For a simple solution, remove one of the clear glass lenses, take it to a glass shop, and have a set of frosted lenses cut to the same size. The frosted replacement lenses will help control the brightness.

Light Placements

Light attracts insects, so locate your lighting away from patios or other places where people might gather. Well-located lighting can help increase the enjoyment of your garden by keeping specific areas relatively bug-free.

Dining Out

Because you have expanded your garden with light, you will be surprised how little light is needed on the patio. A few tabletop candles in hurricane chimneys will probably suffice. ❁

A very simple, but effective outdoor lighting arrangement: low fixtures light the walkway and ground cover greenery, while a few well-placed floodlights light the house's facade. The entire area is softly but safely lighted.

This fountain and formal planting becomes appealing at night. The green and white color scheme is particularly appropriate for highlighting.

Low Voltage or House Voltage?
Outdoor lighting can be powered by regular household voltage or with low-voltage—voltage "transformed" from 120-volts to 12 volts. Here are some considerations:

Low Voltage Systems
A low voltage system consists of a plug-in weatherproof transformer usually equipped with a time clock, the light fixtures, and the wire necessary to connect one fixture to another, and the lot of them to the transformer. The heart of the system is the transformer which converts 120-volt household current to a non-lethal 12 volts. These systems are not only safe and easy to install—well within the capabilities of most do-it-yourselfers—they are inexpensive to operate, as well. The wire can be buried in a shallow trench made with a straight-edge spade. A variety of light fixtures can be connected in any arrangement desired. The size of the transformer, rated in either watts or amps, determines the number of fixtures that can be installed on the system. Be sure to buy the right size transformer for the number of lights you plan to install. Most homeowners set the timer for a four to five hour period, beginning at dusk. These systems will not only beautify your garden, but enhance your security, as well. A six lamp system of 25 watts, illuminated five hours a night, will cost only $2.25 a month at a ten-cent-a-kilowatt-hour utility charge.

Most low voltage light bulbs are commonly used in automobiles. The Par 36 reflector bulb is a tractor headlamp. The new 50-watt "MR 16" quartz lamp is an exciting development. It produces a narrow beam of high intensity light, perfect for accenting a small area from a distance.

House Voltage Systems
Extra safety precautions need to be taken if you decide to power your outdoor lights

with standard 120-volt household current. The entire system will need to be permanently installed using a direct burial grounded cable. Make sure to consult local codes to see if a "ground fault interrupter" is required within the circuit. On the benefit side, the type of light fixtures available for household voltage are more suitable for large trees and where a stronger punch of illumination is desired.

Something New Under the Sun

The Chronar Corp., a pioneer in the field of solar manufacturing, has introduced a new concept in outdoor lighting. It is their Walklite—an outdoor light fixture powered by the sun. A solar panel on one of the three sides maintains the charge of the built-in, rechargeable nickel cadmium batteries so the light will illuminate nightly without any wiring or the continuous replacement of batteries. Walklites turn on automatically at dusk and turn off automatically when their collected energy has been depleted. Three different models are available: two with incandescent light and one with fluorescent. The incandescent Walklites are available with either an average five-hour illumination period per night (after a day of bright sunlight), or a nine-hour illumination period. The solar panel should be positioned where it will receive sun during the day. The specially designed stand allows the Walklite to be easily inserted into the soil. Also available is Chronar's Patiolite, a similar, but larger light fixture for attaching on top of a pole. The Patiolite casts enough light for patios or driveways. For more information, contact: Consumer Products Division, Chronar Corp., P.O. Box 177, Dept. FG, Princeton, N.J. 08542.

Outdoor lighting can also increase the enjoyment of your garden from inside the house. If there is a particularly nice view from an interior window, consider lighting it for your own evening enjoyment.

Hardy Rhododendrons

David G. Leach

When Anthony Waterer of England's famous Knap Hill Nursery exported a large shipment of the hybrid rhododendrons he had produced in Surrey to Philadelphia's great Centennial Exposition in 1876, they were an immediate sensation. Visitors to the fair had never before seen rhododendrons with flowers of red, rose, white, near pink, or purple. Moreover, few realized that Waterer's hybrids had been produced in part from a North Carolina native, *Rhododendron catawbiense*. He chose the Catawba rhododendron because it was hardy, and also because it bloomed late, about the first of June. He had almost a phobia about flowers lost to lingering frosts.

Today, 110 years later, those hybrids are still the standard commercial varieties in the northeastern United States. Commonly called ironclads, they account for an estimated 95% of the rhododendrons sold from Ohio to New York and northward to Maine.

In the mild English climate, myriad rhododendrons now bloom in March and April despite the vagaries of British springtimes. And, thanks to the greatly accelerated propagation possible in American cloning laboratories, rhododendrons that bloom in early April and others that carry on the season until the first of August are now available for cold U.S. climates.

Many of the earliest rhododendrons are unfamiliar-looking slender six-foot shrubs with small leaves, yet they flower with all the abandon of their later relatives. They do, however, like open, exposed planting sites. They light up the landscape at a bleak season, especially with an underplanting of yellow daffodils and white shadblow flowering overhead. Among the most readily available early varieties are the Mezzit hybrids—Wally, deep pink; Laurie, pale pink; Olga, bright pink; and the white Elite. Non-Mezzit varieties include Malta, which produces giant bouquets of semidouble clear pink flowers reminiscent of miniature roses and the emphatically evergreen Hudson Bay, which blooms profusely at the same time, making a fine white companion.

Among the newly available conventional broad-leaved rhododendrons, which bloom as spring gets under way, Vernus is a densely foliaged bright pink that also makes an effective foil for yellow daffodils. Stockholm becomes a snowbank of white flowers several days later. Possibly the most commanding evergreen shrub that can be grown in the eastern United States also blooms at this season. Spellbinder, with its huge trusses of clear frosty-pink flowers on a plant with elephantine foliage and massive appearance, dwarfs any adjoining shrubs both in size and texture. In only a few years, it grows to 15 feet in diameter. All of these rhododendrons are bud-hardy in the range of —15° to —22° F, depending upon their planting sites.

Top: Rhododendron lochae *is the only rhododendron from Australia—the funnel-shaped flowers are scarlet. It is easily cultivated.*

Right: R. zoellei *is from New Guinea. The flowers are showy—orange or yellow-orange, but the foliage and habit are undistinguished.*

David G. Leach, Ph.D., is a renowned rhododendron breeder, as well as a lecturer and writer. He is the author of Rhododendrons of the World *(Scribner, 1961).*

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These new hybrids offer spectacular color from April to August.

Photos by David G. Leach

R. macgregoriae *was named after Lady Macgregor whose husband backed the expedition which discovered it. The flowers are light yellow to dark orange or light red or yellow on tube and/or center, reddish orange on the lobes.*

Early Hybrids

As spring advances into May, the new, early midseason hybrids bloom in ever greater numbers and variety. Many have novel flower colors never before seen in truly hardy hybrids. Two dazzling scarlets, of a color more pure than the reds now popular in the trade, are available: Sumatra, a faultless mound of evergreen foliage, matures at about four feet and supports a dome of cascading flame-colored blossoms. It is suited for planting in regions with a hardiness limit equivalent to the Great Lakes and Atlantic coastal climates as far north as Portland, Maine. Small Wonder is hardier, and a little taller, maturing at about five or six feet.

For many years gardeners in the East have been seeking hardy versions of yellow-flowered rhododendrons, which thrive in England and on the West Coast. There are still no hardy yellows equal in color saturation to the best of those grown in mild climates, but one popular, early midseason cultivar with paler flowers now available is Hong Kong, a big, vigorous plant with large light-yellow flowers marked by a red flare in the throat. The blooms are presented in informal asymmetrical clusters, rather than in the stiff pyramidal trusses demanded in Waterer's time.

In a rhododendron planting, ivory-flowered specimens separate warring colors better than whites do. But until recently, nurserymen have had no hardy hybrids to offer. Now there are two. Ivory Tower, tough, beautiful and superhardy, is one of the most freely flowering rhododendrons. And Luxor, also hardy to about —25° F, blooms a little later with a moonburst of flowers of unusual delicacy and grace.

The best early midseason pink is a selected form of a species that grows wild on Yaku Shima, an island south of Japan. Many specialists regard it as the most captivating rhododendron grown in the northeastern United States. Pink Parasol was chosen from a field of seed-grown *R. yakusimanum* for its rich pink buds that open to large classic globes of pale pink flowers, creating an apple-blossom effect unmatched in its elegance and distinction. Its leaves are a distinguished soft bluish-green. Although it grows slowly at first, after reaching 12 inches its pace quickens until the plant reaches a height of five feet and a spread of 10 feet at maturity.

For climates less harsh, there is a series of Shammarello hybrids with aristocratic names preceded by Yaku, all of which are oustanding. They vary in the pinkness of their flowers and to some extent in their blooming season. My favorites are Yaku Prince and Yaku Duchess.

Finlandia is an early midseason white of distinctive appearance. The leaves are small, round, convex and downturned. Landscape architects seek it out for the unique texture of its foliage and for its clean trusses of glistening white flowers, freely produced.

Midseason Colors

Midseason brings the exotic "art shades" in new hybrids, long available in mild climates but only

recently in the Northeast. It also offers varieties with the highest-quality combinations of flower and foliage. Bravo, for example, is a strong, bright pink. This is a rhododendron with panache, a dominant specimen.

Party Pink, a classic, is the winner of every award offered for a rhododendron hybrid, including the American Rhododendron Society's Superior Plant Award. It is a light shade with a hint of lavender and a bronze flare, heavily foliaged and about six feet tall at maturity. Party Pink has been undamaged by −28° F. Nepal is another superhardy award winner. A handsome plant at all seasons, with large leaves and still larger white flowers opening from pink buds, Nepal becomes a big, imposing shrub, ultimately 15 feet tall. There is also a diminutive version, Anna H. Hall, which is just as hardy.

Nile is the best of the midseason yellows and is an attractive plant at all seasons because of its shiny, fresh green foliage. The flowers are a pale shade, produced bountifully.

Golden Gala received its name because it was chosen as the flower of the 50th-anniversary celebration of the Holden Arboretum in Mentor, Ohio. It is an emphatic ivory, not quite yellow. The carriage of the crisply outlined flower and the mien of the plant with its thick foliage characterize Golden Gala as a hybrid of style and distinction. A very hardy rhododendron, it did not lose its buds during the coldest winter in 103 years in northern Ohio. Maturing at about six feet, it's ideal for small gardens.

As the midseason of rhododendron bloom lengthens, the exotic salmon-pinks and other shades of pink mixed with yellow or orange become prominent. Long favorites in mild climates, these flowers have until recently never been seen in the northeastern United States. Bali is a delicate pale pink suffused with yellow, producing a meld that might be called shrimp pink. In Nuance the yellow is concentrated in the throat of the flower. Duet, later-blooming and somewhat hardier, is yellow with a pink margin. When it first bloomed, its impact was so striking that it was featured in *Life* magazine.

There is a new blooming season for hybrid rhododendrons: summer. An array of varieties with a broad flower-color range is in the offing. But until they appear, try Summer Snow, the first to bloom, with mammoth flowers in loose clusters on a large, vigorous plant with a treelike form; and the July-blooming Summer Summit, more densely foliaged, with immaculate white flowers handsomely framed by dark green leaves. This, too, is vigorous, and matures at about 12 feet. Summer-blooming rhododendrons are on the leading edge of new developments for the species. Where growing space is available, there is no competition for the cool display these hybrids provide. ❋

Growing Tips

Common name: Rhododendron
Botanical name: *Rhododendron* spp.
Dimensions: 20-35″ high and wide.
Bloom time: April to August.
Soil: Acidic, with humus; mulch with pine needles, oak leaves or wood chips; good drainage essential.
Nutrients: Add only if plants grow less than 4-6″ per year.
Water: Avoid alkaline water.
Light: 20-30% shade desirable; full sun OK, but avoid hot, windy sites.
Spacing: Conventional-size plants: for immediate effect, plant 5′ apart and plan to remove every other plant.
When to plant: Early April until growth starts; again in August and September.
Pruning: Usually not necessary. Isolated areas of winter injury and broken branches can be removed anytime. If you prune to maintain a compact shape, snip or pinch off small terminal buds—not the larger blossom buds—in early summer.

Sources

Baldsiefen Nursery
Box 88
Bellvale, NY 10912
(catalog $3, refundable)

Bovees Nursery
1737 S.W. Coronado St.
Portland, OR 97219

Greer Gardens
1280 Goodpasture Island Road
Eugene, OR 97401-1794
(catalog $2)

Wayside Gardens
Garden Lane
Hodges, SC 29695-0001
(catalog $1, refundable)

In the Beginning:

Small Successes

Ann Lovejoy

New to the delights of rock plants, enthusiastic gardeners join the American Rock Garden Society, attend meetings, and visit a few gardens. After seeing slides of what experienced gardeners have wrought, we rush home, rip out most or all of our turf and replace it with incipient alpine meadows, a scree, or a model peat bog. After a great deal of work, and the outlay of a considerable amount of cash, we sit back and gaze at our handiwork. Dotted about a seemingly enormous landscape, a handful of rare and choice rock plants make their stand. All are carefully chosen for slow development, tight habit, precious smallness; we know we selected the right stuff, but why didn't these things GROW?

A new rock garden can look a little bleak. Fortunately, there are a number of plants that can safely be introduced to soften such a raw landscape. All of the following will quickly make a good effect without overrunning your precious tortoises. Even the rowdiest are easily controlled, and all will reward your efforts generously and soon. As your choice rarities mature, you can replace these eager youngsters—but don't be surprised to see them persisting in some mature and sophisticated gardens. Some very easy plants are too lovely to do without, common or no.

While you are waiting for your perennials to mature, why not have recourse to a few dainty annuals? If you have a sunny and empty pathway or a sloping bed of infant subshrubs, try sprinkling the area with stardust. That is the common name of *Leptosiphon hybridus,* an obscure member of the Polemoniaceae sometimes classified as *Gilia* x *hybrida.*

This little creature rarely exceeds three or four inches in height and consists of little feathery bursts of fresh green threadlike foliage spangled with minute star flowers in cream, white, pink, rose, yellow, and gold, all with a central disk of tufted orange silk. A pinch of seed, scattered every three weeks, produces these tiny flowers from late spring through early fall. Native to California, this unassuming plant had to go to Europe to be appreciated. French charm school did wonders for it; now much hybridized, and frequently grown throughout Europe, it deserves a warm welcome back to its native shores. In a mild year, leptosiphon reseeds in my garden, where it is scattered between paving stones and among mats of creeping thymes and veronicas. It seems to prefer a rather rich yet gravelly soil in full sun—or as full sun as Seattle can claim.

Another delicate annual which frequently reseeds is *Ionopsidium acaule,* the violet cress. This one prefers shade, from which it may emerge into the sun, but it won't settle down satisfactorily unless given a cool, shady starting place, perhaps between bricks or flagstones. Once established, the tiny flowers of dusky violet are open nearly year round. They are typical crucifer blossoms, little four-petaled things, dainty looking but tough as nails. The small leaves are rounded, much like a miniature water cress, and of a deep, fresh green. The whole plant is under three inches in height. In one exceptional (and unplanned) partnering, the ionopsidium sowed itself into the arms of *Pimelea prostrata* var. *coarctata.* This ever-gray shrublet has brown wiry branchlets covered

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Bulletin of the American Rock Garden Society
15 Fairmead Rd
Darien, CT 06820

with alternating pairs of opposite leaves, blue-gray on cherry-red stalks. It forms a flat mat several feet wide and under an inch tall. In May, the scent of its tubular white flowers explains the garden name of New Zealand daphne. These flowers become minute berries, pearly little peppercorns, in the fall. The violet ionopsidium flowers are lovely among those silvery leaves in every season.

To cover larger areas, there are any number of creeping thymes, many found in the most sophisticated gardens as well as in the youngest, and rightly so. Where drainage is poor, it is worth digging some coarse builder's sand into the soil to improve the texture. These sun-loving Mediterraneans will show their appreciation in long and outstanding performances.

Thymus serpyllum varieties will quickly form thick, smooth carpets. They are of a particular rich green, and although evergreen, they seldom get windburned as so many "finer" thymes do. The flowers may be rosy, white, pink, or lavender, and depending on form, may bloom briefly and shyly or long and hard, so it is worth paying a bit more for a proven, named variety.

The woolly gray mats of *T. doerfleri hirsutus,* and others all have pinkish flowers of varying intensity. These are pleasant edge softeners for paths and make textured patterns when mixed into green thyme carpets. Thymes take a fair amount of foot traffic, and most are well-placed among paving stones. Established mats make wonderful breeding grounds for seed of certain rather difficult plants; clematis, meconopsis, primroses, astrantias, all seem to like a nursery bed of thyme. One of the delights of winter gardening in mild areas is weeding through the thyme beds; the various scents come thick and fast, pungent on the chilly air. Weeds pull out easily from the rain-softened soil, and among the raggedy volunteer seedlings, there are always a few treasures.

To add a bit of height without undue weight, consider some fine and well-mannered grasses. I love the sweeping curves of the carexes, sedges which have garden impact even when quite young. Not true grasses, they bring the same kind of airy grace to the garden. Thoughtfully placed and given appropriate conditions, they have a lovely presence for many months. These sedges spread slowly but politely, the thickening tufts remaining right where you put them. *Carex buchanani,* the leatherleaf sedge, has delicious caramel curves, each slender grassy leaf edged with coiling threads of copper and bronze. In winter, they take on pink and gold tints, especially lovely in the snow. This reaches about 12 inches and spreads as much as six or eight inches across in time. A lovely cousin *C. morrowii* is similar, its curls a strong, rich green. There is a very attractive variegated form, *C. morrowii* 'Variegata' with ivory-edged blades. All take sun or partial shade with equanimity, spreading most quickly in a rich, fast-draining soil.

A true grass which has recently appeared on the garden scene is *Imperata cylindrica rubra,* the Japanese blood grass. This stunning plant is quite hardy, even in cold winter areas, needing only a loose protection of branches during the coldest months. In good garden soil, it fattens up fast into plump tussocks of ruddy leaves, 12 or 14 inches tall. The base of the plant is deep green, stippled with caramel and a purplish red that increases until the upper portion of each leaf-blade is a strong, clear crimson. This showy grass enlivens plantings of flat creepers and subshrubs. A few clumps will zip up a group of prostrate junipers no end. And mixed in with a sweep of the satin-black *Ophiopogon planiscapus* 'Arabicus' ('Nigrescens'), it is a definite crowd pleaser, beautiful for most of the year.

These grasses are wonderful fillers for those blank expanses in newer gardens and are displayed to advantage when each clump is set several feet apart. Spread a welcome mat or two of thyme, spangle the empty places with the tiny stars of leptosiphon, enhance the promising young landscape with fountains of blood grass. Soon, you won't be waiting impatiently for your garden to mature. There will be plenty to admire and appreciate, with more good things on the way. It's crucial to look ahead and plant those slow-growing treasures for the garden of the future, but it's also well worth treating yourself to a few ephemeral, questionably lesser delights to bring you pleasure nearly at once. ✿

Gardener's Right Hand

Anti-transpirants have become a year-round tool for gardeners, indoors and out. Since the first anti-transpirant, Wilt-Pruf, was introduced 35 years ago, more and more uses have been found for these plant protectants.

Just as cloches and other transparent covers protect plants from environmental stresses, anti-transpirants provide a shield—but one that is applied directly to the plant, rather than surrounding it. They were originally developed to reduce moisture loss from broadleaf and needle evergreens in winter, by coating the leaves and stems with a clear, flexible film that seals the stomata or pores. Sprayed on the plants in autumn, they lower the transpiration of moisture and thus prevent desiccation when roots in frozen soil are unable to replace the moisture.

This ability to conserve moisture in the plant is valuable in other seasons and circumstances, too. In tests in Alabama and Tennessee, anti-transpirants increased the survival rates of trees and shrubs sprayed just before transplanting in spring and summer. Gardeners report that spraying annuals and perennials in the ground and in containers in hot, dry summers keeps them looking, growing and flowering better with less water. Some landscapers spray newly-laid sod to keep it from drying out until new roots are established. The University of California has shown that some anti-transpirants sprayed on fruit trees two weeks before harvest increased fruit size, and reduced cracking of cherries.

The protectants are also useful for propagation and storage. For some plants, dipping all but the basal end of leafy cuttings in an anti-transpirant results in better and often faster rooting than does propagating under mist, and without the leaching of nutrients from the leaves that occurs under misting. Spraying bare-root trees and shrubs and dormant roses bought in early spring will keep them in good condition until the weather allows planting. Bulbs, corms and tubers come through winter storage in better condition when sprayed or dipped in an anti-transpirant.

Disease control is the newest role for anti-transpirants. At Texas Tech University, zinnias sprayed several times from seedlings to maturity had much less powdery mildew than plants treated with fungicide. Several other diseases were also suppressed in varying degree, and the zinnias grew much more vigorously and flowered longer because of the increased water and nutrient content of the plant cells.

Anti-transpirants will also help prevent salt-spray injury from de-icing salt . . . reduce wilting and leaf loss on newly acquired houseplants until they adapt to the lower humidity in the home. . . act as "stickers" when added to pest control materials . . . reduce fire hazard when sprayed on the Christmas tree. . . and even deter Christmas tree thieves by making garden evergreens unattractive (Cornell University suggests painting the plants with a mix of pink food coloring, hydrated lime and Wilt-Pruf). ❊

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RECENT BOOKS WORTH NOTING

In the Library of the Brooklyn Botanic Garden. (Please order directly from your bookstore, not the Brooklyn Botanic Garden.)

The book reviews that appear in this issue of *Plants & Gardens* are usually done by the editor. This year a number of staff members have participated in their various areas of expertise. They are: Brenda Weisman, Director of Information Services; Kerry Barringer, Taxonomist; David Brandenburg, Curator of the Herbarium; and Steve Scaniello, Rosarian.

Reviews also appear in *Plants & Gardens News* and are not duplicated here.

There are many books from the British Isles again as in past years. Gardeners must by now be accustomed to making transatlantic translations.

BBP, Editor

BEAUTIFUL BOOKS

Cottesbrooke: An English Kitchen Garden by Susan Campbell. Salem House Publishers, Topsfield, MA. $24.95. The fine print at the back of the title page gives what should be the title on the title page, **Cottesbrook: The Diary of a Traditional Kitchen Garden.** As a diary it is charming à la G. Tabor's **Stillmeadow Tales.** Lack of index, bibliography, plant lists and sources can easily be forgiven.

Flowering Trees and Shrubs: The Botanical Paintings of Esther Heims. Abrams, NY $29.95. A random selection of northeastern plants, chronicled by a fine botanical artist, including an excellent discussion of her art by the artist. A coffee table book.

Georgia O'Keeffe Arts & Letters by Jack Cowart & Juan Hamilton. Letters, selected and annotated by Sara Greenough, National Gallery of Art, Washington in association with NY Graphics Society Books and Little, Brown and Company, Boston. $50.00. The extraordinary effect, on her art, of her observations of plants and nature is beautifully illustrated and annotated. A book befitting an unusual woman.

Jacques Hnizdovsky Woodcuts and Etchings by Abe M. Tahir. Pelican Publishing Co., Gretna, LA. $39.95. This volume contains all of the woodcuts and etchings of Hnizdovsky (350 linocut and woodcut designs). The book is beautifully produced and the images so very appealing.

Majestic Island Worlds, prepared by the Special Publications Division, National Geographic Society, Washington, D.C. Pictorial journey to islands of the world. A pleasing escape via the armchair beside the fire. Lovely book.

Mary Anne's Garden by Mary Anne McLean. Harry N. Abrams, NY. $35.00. Charming book with lovely illustrations along the line of Jane Holden's **Country Diary of an Edwardian Lady.** The author is a keen observer and talented illustrator.

Mr. Marshall's Flower Album from the Royal Library at Windsor Castle by John Fisher. David & Charles, Inc., North Pomfret, VT. $49.95. This collection dating from the mid-seventeenth century has not been seen by the public. The paintings are of garden flowers—over 120 in all. Marshall derived pigments from nature and his paintings are vibrant in color.

Piercing the Surface: X-Rays of Nature by Carlo & Stefano Greco. Harry N. Abrams, NY. $29.95. X-ray photography as art. The section on plants is stunning. Interesting to leaf through.

Portraits of Earth by Freeman Patterson. Sierra Club Books, San Francisco, CA. $35.00. An amazing collection of photographs explore patterns and designs in nature. The photographer obviously explores his subjects with an unusual depth of understanding.

Redouté's Fairest Flowers by Martyn Rix & William T. Stearn. Prentice Hall Press, NY. $35.00. Redouté is best known for his roses. In this book, lilies, lilacs, honeysuckle, peonies, dahlias and even some fruit grace the pages of this lovely collection of engravings.

GARDEN DESIGN

Creating Topiary by Geraldine Lacey. Garden Art Press, Northiam, East Sussex, UK. $29.50. Excellent topiary how-to. Well illustrated. Line drawings give step-by-step instructions supplemented by black & white and color photographs.

Creative Home Landscaping. Ortho Books, San Francisco, CA. $24.95. Many excellent color photographs provide design ideas. Text takes the reader through all the steps of designing and installing the landscape. Plant guide provides information on 400 vines, trees, shrubs, ground covers and grasses.

The English Country Home edited by Vanessa Berridge. Salem House Publishers, Topsfield, MA. $29.95. A compilation of articles which appeared in the magazine *Country Homes and Interiors.* The beautiful color photographs depict interiors, gardens and landscapes. A must for any Anglophile.

Everlasting Design by Diana Penzner with Mary Forsell. Facts on File, NY. $18.95. This is a nicely illustrated book—full of personal "tips." Excellent appendices including bibliography, and two pages of useful addresses. The illustrations are particularly good.

Garden Rooms by Robert Stone. Salem House Publishers, Topsfield, MA. $14.95. With a few exceptions, a broad general discussion of plants in true garden rooms or greenhouses. Well illustrated with color photos containing good ideas.

Gardening Southern Style by Felder Rushing. University Press of Mississippi, Jackson, MS. $14.95. A good regional book with much of value nationally. Good reading. The "Additional Resources" section (11 pages) is especially valuable as is the index (with common names).

Gardening with Dwarf Trees & Shrubs by Andreas Bärtels. Timber Press, Portland, OR. $32.95. This is an informative book and well-illustrated. The drawback is the disclaimer about many of the plants not being available from garden centers, "but some (garden centers) are willing to order from specialty growers." A nursery source list would have made this book truly valuable. There's nothing more frustrating to a gardener than plants without sources.

Garden Ornaments and Statuary by Peter McHoy. Salem House Publishers, Topsfield, MA. $14.95. Not too much current on this special subject so the book is welcome and quite attractive. The source list is strictly British even considering the author's comment that "the majority of them (the companies listed) are used to dealing with export orders to the U.S. and elsewhere.

Lanning Roper and His Gardens by Jane Brown. Rizzoli, NY. $35.00. An excellent biography documenting the work of an American garden designer who created gardens here and in England. Good color and black & white photographs.

Outdoor Spaces—Landscape Design for Today's Living by Jack Maguire. Henry Holt, NY. $19.95. Not much new or exciting in this rather superficial treatment of too many subjects.

The New Englishwoman's Garden by Alvilde Lees-Milne & Rosemary Verey. Salem House Publishers, Topsfield, MA. $29.95. Here is a companion volume to the first **Englishwoman's Garden** published in 1980. Twenty-eight gardens are described by their owners. Lovely color photographs complement the text.

The New Victory Garden by Bob Thomson. Little, Brown, Boston, MA. $29.95 hardcover; $19.95 paperback. Organized in a month-by-month format, the gardener is guided through the steps to successful vegetable gardening. Profusely illustrated with color photographs, the book is attractive and will serve as an inspiration for growing mouth-watering produce.

Pictorial Library of Landscape Plants, Vol. I Northern Hardiness Zones 1-5 by M. Jane Coleman Helmer. Merchants Publishing Co. $95.00. Large format book with color photographs throughout. Descriptions, cultural requirements and uses accompany photographs. Close-up of details often provided. Useful reference. (Prepared for Shemin Nurseries, Inc., Greenwich, CT.)

GARDENING TECHNIQUES

Gardening and Beyond by Florence Bellis. Timber Press, Portland, OR. $19.95. The author developed the Barnhaven strains of primroses and is a nurseryman of 30 years experience. There is a lot of good information here and in addition it is a good winter read.

Gardens for Children by Tigger Wise. ISBS, Portland, OR. $10.95. What to plant or not to plant in gardens for children. Trees to climb, vegetables to eat, places to hide are all components of attractive gardens for kids. Not good illustrations, however.

Jeff Ball's 60 Minute Garden: One Hour a Week is all it takes to Garden successfully. Rodale Press, Emmaus, PA. $16.95. The author has devised a system that takes work to put in place, but once installed will save the gardener time. I personally don't think 60 minutes will do it though!

The Kitchen Gardener's Guide edited by Donald J. Berg. Ten Speed Press, Berkeley, CA. $7.95. Excerpts from nineteenth century catalogs from journals and encyclopedias instruct on tried and true methods of vegetable gardening. No sprays were used. Sources listed.

Let Nature Do the Growing: The Fertilizer-Free Vegetable Garden by Gajin Tokuno. Japan Publications, NY. $15.95. The title sounds too good to be true although the book is based on fifteen years of the author's own experience. Describes the care of 78 different plants.

The Organic Garden Book by Geoff Hamilton. Crown Publishers, NY. $27.50. This is a wonderful basic gardening book whether organic or not. Many of the basic premises of organic gardening are controversial because they are, in general, based on folklore and personal observation, rather than on scientific experiments. The illustrations are not only excellent but helpful!

Plants Plus: A Comprehensive Guide to Successful Propagation of House & Garden Plants by George Seddon & Andrew Bicknell. Rodale Press, Emmaus, PA. $14.95. Introductory material leads the reader through the various methods of propagation. An encyclopedia section follows covering the different types of plants. Profusely illustrated.

The Weekend Gardener by Peter McHoy & Roger Swain. Harper & Row, NY. $19.95. Weekend, Maybe! Low-maintenance—No! Nothing new, but pleasant looking and reading anyway.

The Harrowsmith Perennial Garden by Patrick Lima. Camden House, Ontario, Canada. Since this book was written by a gardener in Canada it provides information for the northern gardener. Garden plants, plants for problem places, plants for seasonal color, plants through the growing season. Nicely illustrated.

HERBS

Chinese Herbal Medicine by Daniel P. Reid. Eastland Press, Seattle, WA. $60.00. This is a charmingly illustrated book replete with philosophical aspects of the subject. The illustrations, descriptions, common, scientific and Latin names provide a wealth of very readable information.

The Harrowsmith Illustrated Book of Herbs by Patrick Lima. Camden House, Ontario, Canada. $19.95. A very complete book on creating and maintaining an herb garden in the northern climes. Lovely photographs and watercolor illustrations combine nicely in this attractive, useful volume.

Herbs & Spices by Gail Duff. Salem House Publishers, Topsfield, MA. $16.95. Recipes, cultivation, medicinal uses, household uses. Lore and delightful drawings make up this book which covers 47 herbs and spices.

Herbs, Spices and Medicinal Plants: Recent Advances in Botany, Horticulture & Pharmacology, Vol. 2 edited by Lyle E. Craker, James E. Simon. Oryx, Phoenix, AZ. $65.00. Aside from some of the more technical chemistry, this on-going series is excellent "must" reading for anyone interested in these topics. The articles are extraordinarily well-documented and the bibliography and index are superb.

Landscaping with Herbs by Jane Adams. Timber Press, Portland, OR. $29.95. Many designs for herb gardens, suggestions for plant combinations, planting and care combine to make this a most useful book. Color photographs feature the plants. Helpful appendices.

Thyme on My Hands by Eric Grissell. Timber Press, Portland, OR. $19.95. This book is the story of the author's gardening ventures—not a how-to gardening book. Related with humor and illustrated with line drawings. Interesting read on a winter's night.

POISONOUS PLANTS & MUSHROOMS

Mushrooms: A Macmillan Field Guide by Alan Bessette & Walter J. Sundberg. Macmillan Publishing Co., NY. $24.95. Excellent color photographs accompanied by good descriptions of more than 200 common mushrooms. Index and excellent bibliography are helpful.

The Mushroom Manual by Lorentz Pearson. Naturegraph, Happy Camp, CA. $8.95. The book has an excellent understandable key, good index and glossary, but where mushroom I.D. is concerned, an absence of color illustration limits its usefulness.

Peterson Field Guides—Mushrooms by Kent & Vera McKnight. Houghton Miflin, Boston, MA. $19.95. Excellent color drawings. Although this is not a key the descriptions are detailed and understandable.

Poisonous Plants of California by Thomas Fuller & Elizabeth McClintock. University of California Press, Berkeley, CA. $25.00. Don't let the geographic restriction fool you. Although it lacks illustrations—just a few line-drawings and photos—it is an excellent addition to the literature on the subject. The appendices and indices particularly have a wide application.

PLANT GROUPS

Bamboos of China by Wang Dajun and Shen Shao-Jin. Timber Press, Portland, OR. $21.95. The bulk of this work consists of taxonomic keys, technical descriptions, and illustrations of bamboos native to China. Professional botanists, or gardeners with a serious interest in the subject will find this reference book most useful.

Cacti for the Connoisseur: A Guide for Growers & Collectors by John Pilbeam. Timber Press, Portland, OR. $44.95. Beautiful color and black and white photographs make this a valuable book for the collector. Written by an expert in the field.

Conifers by Keith Rushforth. Facts on File, NY. $24.95. General introductory chapters cover use of conifers in the garden, their care, biology and effect. A gazetteer follows listing 600 species in alphabetical order. Nice line drawings and some color photographs. Good book for the conifer enthusiast.

Diseases of Trees and Shrubs by Wayne A. Sinclair, Howard H. Lyon & Warren T. Johnson. Cornell University Press, Ithaca, NY. $49.95. Not a book for the average gardener although the color photographs would help diagnose problems. Descriptions of the diseases are complex and scientific. Excellent reference.

Encyclopedia of Ferns by David L. Jones. Timber Press, Portland, OR. $50.00. A thorough, exceptionally well-illustrated how-to and

descriptive treatment of ferns from all over the world. Excellent appendices covering cultivation requirements, pesticides, glossary, bibliography, societies and common and Latin names, including varieties and cultivars.

English Water Gardens by Guy Cooper, Gordon Taylor and Clive Boursnell. Little Brown, Boston, MA. $24.95. A beautifully illustrated guide to English gardens featuring water in their designs. This is mostly an idea book through photographs.

Fall Wildflowers of the Blue Ridge & Great Smoky Mountains by Oscar W. Gupton & Fred C. Swope. University Press of Virginia, Charlottesville, VA. $12.95. This is a wonderful resource and would be nice for all regions. Plants, color-indexed; index of common and scientific names.

Growing Succulent Plants Including Cacti by Victor Graham, Illustrations by Heather Graham. Timber Press, Portland, OR. $19.95. The author concentrates on the native habitat of this group of plants as a guide to their culture. Written in a clear, concise manner by an expert in the field.

A Handbook of Mexican Roadside Flora by Charles T. Mason, Jr. and Patricia B. Mason. The University of Arizona Press, Tucson, AZ. $14.95. A most welcome guide to the conspicuous trees and shrubs encountered along Mexican highways. The text, in English, contains brief botanical descriptions as well as notes on various other interesting aspects of the plants; illustrated with line drawings.

A New Key to Wild Flowers by J. Hayward. Cambridge University Press, NY. $49.50. If you want to identify a local wild flower, you have to either look through a picture book or pull out a technical key. John Hayward has found a better way. His book is an unusual and easy-to-use key to the plants of the British Isles. You start at the front of the book, matching pictures and descriptive phrases against the plant in hand (or at foot). A simple, illustrated glossary is included to define technical and ambiguous words. Many of our weedy wild flowers are introductions from Europe, so this book can be useful.

Native Shrubs for Landscaping by Sally Taylor, Glenn Dreyer & William Niering. The Connecticut Arboretum at Connecticut College, New London, CT. Many native shrubs can be obtained from nurseries. Here a number are described, illustrated and sources listed. Attractive and helpful.

Native Trees, Shrubs and Vines for Urban and Rural America by Gary L. Hightshoe. Van Nostrand Reinhold, NY. $79.95. This is replete with good information and excellent black & white illustrations of silhouettes of leaves, winter buds and flower details. It has both an excellent glossary and bibliography and an index of common and Latin names. A good reference.

Nursery Sources: Native Plants & Wildflowers. New England Wildflower Society, Inc., Garden in the Woods, Hemenway Rd, Framingham, MA. 01701. $6.45. Lists sources of seeds and propagated plants for 200 desirable wildflowers. Also gives information about nurseries that propagate native plants. Very useful.

The Plant Book by D.J. Mabberly, Cambridge University Press, NY. To say this is a basic taxonomic reference may be missing the point. This is probably THE basic taxonomic reference. Every genus and family of higher plants is listed with data on its size, distribution and relationships. If a recent monograph is available, it is also listed. The care he took in assembling the data ensure that the book will remain useful for many years.

The RHS Encyclopedia of Houseplants—Including Greenhouse Plants by Kenneth A. Beckett. Salem House Publishers, Topsfield, MA. $34.95. An excellent reference book. Good photographs and easy-to-use text. Victoria Jahn, American consultant (BBG).

Trees by Benjamin Perkins. Salem House Publishers, Topsfield, MA. $24.95. The trees of the British Isles are the subjects for this collection of 58 color paintings and pen-and-ink drawings. Interspersed with lore and personal observations, this large-format book is a delight to peruse.

Trees of North America by Alan Mitchell; illustrated by David More. Facts on File, NY. $24.95. Assembled in the manner of a field guide, but much too large to carry around, this book is an excellent reference. Section devoted to selecting, pruning and cultivating provides practical information for the gardener.

Weeds of the United States and Their Control by Harri J. Lorenzi and Larry S. Jeffery. Van Nostrand Reinhold Co., NY. $69.50. Deals with ca. 300 weeds and includes color photographs, distribution maps, botanical descriptions, habitat notes, and suggested methods of control. Also discusses the proper application of currently available herbicides.

Wildflowers: Macmillan Field Guides by Robert H. Mohlenbrock. Collier Books/Macmillan, NY. $9.95. Very handy field guide covering 304 of the most common wildflowers. Excellent color photographs accompanied by easy-to-read text make this a most useful field guide.

The Wildflower Gardener's Guide by Henry W. Art. Storey Communications, Inc., Pownal, VT. $9.95. This edition focuses on the northeastern part of North America. Practical nonsense approach to gardening with wildflowers. 32 species discussed in depth. Good beginning to the subject.

ORCHIDS

An Introduction to the Cultivated Angraecoid Orchids of Madagascar by Fred E. Hillerman and Arthur W. Holst. Timber Press, Portland OR. $32.95. Combining the knowledge of two noted experts on the orchids of Madagascar, this extensively illustrated book covers the history, ecology, and geography of the island as well as providing detailed descriptions and information on the native angraecoids. A must for anyone seriously interested in orchids.

The Genus Paphiopedilum by Phillip Cribb. Kew/Timber Press, Portland, OR. $36.95. This is the latest word on the biology, taxonomy and cultivation of the tropical Asiatic slipper orchids, *Paphiopedilum*. Cribb straightens out the nomenclatural problems in the genus and provides complete histories, descriptions, and line illustrations for sixty species. Most of the species are also illustrated with beautiful color plates taken from "Curtis' Botanical Magazine" and "Kew" Magazine. The plates by Pandora Sellars are especially noteworthy in their accuracy, detail and beauty. As you would expect from the publishers, this is an excellent and well-produced volume for botanists and enthusiasts, but beyond the reach of most amateurs.

ROSES

The Charm of Old Roses by Nancy Steen, Milldale Press, Washington, D.C. $24.95. This book presents the subject of Old Garden Roses with a "personal" touch. Without overwhelming the reader with facts, dates and names, ample information is offered. It's a good reference for OGR fans and for people who are interested in learning about them (including some valuable tips on culture of OGR). Some of the photos are weak.

Combined Rose List by Beverly Dobson, 215 Harriman Road, Irvington, NY, 10533. $7.50 ppd. Prepared each year, this is the most complete listing of old and modern roses and where to find specific varieties available commercially.

The Companion to Roses by John Fisher. Salem House Publishers, Topsfield, MA. $24.95. An excellent resource, full of information on everything from history to horticulture of roses. I found the historical information on famous rose breeders very interesting. Enjoyable and informative. Good botanical information, too.

A Garden of Roses by Graham S. Thomas. Salem House Publishers, Topsfield, MA. $29.95. This book begins with a brief historical look at roses and Ellen Willmott. The reproduction of Parson's watercolors and Thomas's commentaries make this book a valuable reference to old garden roses and species roses.

Simon & Schuster's Guide to Roses by Stelvio Coggiatti, NY. $22.95. An excellent reference/handbook for beginners and experienced rosarians. A bit weak on horticulture—the section on pruning needs diagrams or photos. The second section (the main part) is a terrific encyclopedia of roses ranging from species up to modern hybrids. The photographs are excellent. It's a good size to carry in the field.

FOR THE TRAVELER

Adventuring in the California Desert: The Sierra Club Travel Guide by Lynne Foster. Sierra Club Books, San Francisco, CA. $12.95. This travel guide covers such areas as the Mojave, Death Valley, Joshua Tree National Monument and the Colorado Desert. Excellent guide to enjoying these fragile eco-systems.

The American Garden Guidebook by Everitt Miller & J.S. Cohen. Evans, NY. $8.95. The description of BBG is the best I've seen so I assume this whole book has been thoughtfully and carefully researched.

Gardens of the Italian Villas by Marella Agnelli. Rizzoli International Publications, Inc., NY. $50.00. The reader will visit 36 villas many of which date from the Renaissance and have never been seen by the public. The photographs and gardens are lovely—paradise indeed.

Sierra Club Guides to the National Parks of the

. . . Desert Southwest	**$14.95**
. . . East and Middle West	**$14.95**
. . . Pacific Northwest and Alaska	**$14.95**
. . . Pacific Southwest and Hawaii	**$14.95**
. . . Rocky Mountains and the Great Plains	**$12.95**

Random House, NY. Beautifully illustrated with color photographs, maps and excellent indices. A chapter is devoted to each park with facility charts, addresses, phone numbers, hours and trail charts. Flora and fauna for each park are identified and illustrated.

A MISCELLANY

Andersen Horticultural Library's Source List of Plants and Seeds. $29.95. There are over 30,000 entries for trees, shrubs, vines, perennials, herbs, annuals, vegetables and fruits. Sources have been selected from 200 nurseries with broad geographic coverage. Listing only; no descriptions of plants. Available from: The Andersen Horticultural Library, The Minnesota Landscape Arboretum, 3675 Arboretum Dr., Box 39, Chanhassen, MN 55317.

Arranging Everlasting Flowers compiled by Mary Newnes. Henry Holt and Co., NY. $17.95. Beautiful color photographs of flower arrangements with step-by-step instructions accompanied by line drawings. Nicely done.

The Brightest Jewel by E. Charles Nelson & Eileen M. McCracken. Boethius Press, Kilkenny, Ireland. $46.00. This large-format book is the definitive history of the National Botanic Gardens: Glasnevin in Dublin, Ireland. It is illustrated with old maps, drawings and photographs.

Dried Flowers: A Complete Guide to Growing, Drying & Arranging by Malcolm Hillier & Colin Hilton. Simon and Schuster, NY. $19.95. The title describes the contents but not the fact that the book is a visual delight. Lots of excellent color photographs illustrate step-by-step instructions.

The Garden Art of China by Chen Lifang & Yu Sianglin. ISBS, Inc., Portland, OR. $27.95. Gardening is an art in China as is demonstrated by the Chinese authors of this book. Profusely illustrated in color and black and white along with the descriptive text gives insights to this ancient art.

Gardening with the New Small Plants by Oliver E. Allen. Houghton Mifflin, Boston, MA. $19.95. This is a good well-illustrated update on the subject. The appendix includes a very welcome source list and an excellent comprehensive bibliography listing both out-of-date classics and the best of the new works. Covers

dwarf and miniature shrubs, flowers, trees and vegetables. Good color photos.

The Garden and Farm Books of Thomas Jefferson, edited by Robert C. Baron. Fulcrum, Golden, CO. $20.00. This is the first publication of Jefferson's farm books which were transcribed from his original journals kept over a period of 60 years. It is a fascinating account.

Gardening by Mail 2: A Source Book by Barbara J. Barton. Tusker Press, Sebastopol, CA. $16.00. A wonderful source of information: lists seed and plant sources, garden supplies, services, horticultural organizations, books and magazines. Nicely organized.

Leonardo Da Vinci on Plants and Gardens by William A. Emboden. Dioscorides Press, Portland, OR in cooperation with The Armand Hammer Center for Leonardo Studies at UCLA. $34.95. Anything which gives us further insight into another facet of this consummate Renaissance man is a welcome addition, especially one as readable as this one. It is well-annotated, well-indexed and has excellent appendices. This is a thorough approach to the subject.

The Opinionated Gardener by Geoffrey Charlesworth. David R. Godine, Boston, MA. $16.95. A collection of essays written by an avid gardener about his personal passion—rock gardening. Wonderful reading. Good book for the bedside.

Tom Brown's Field Guide to the Forgotten Wilderness by Tom Brown, Jr. The Berkeley Publishing Group, NY. $7.95. Tom Brown finds wilderness everywhere. He is a keen observer and lover of nature. Good reading.

The Year at Great Dixter by Christopher Lloyd. Viking, NY. $24.95. A personal history of the garden in which the author has spent his life. The seasons are chronicled and beautifully recorded in color.

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I certify that the statements made by me above are correct and complete.
Barbara B. Pesch, *Editor*

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